



# Tucson Regional Water Coalition

*Prosperity - Sustainability - Community*

February 3, 2010

City of Tucson Mayor & Council,

Arizona Builders Alliance

Alliance of Construction Trades

Arizona Small Business Association

Marana Chamber of Commerce

Metropolitan Pima Alliance

Northern Pima County Chamber of Commerce

Safe and Sensible Water Committee

Southern Arizona Home Builders Association

Southern Arizona Leadership Council

Tucson Association of Realtors

Tucson Metropolitan Chamber of Commerce

Tucson Utility Contractors Association

Tucson Hispanic Chamber of Commerce

The Tucson Regional Water Coalition (“the Coalition”) is a group of business and trade organizations collectively representing over 250,000 jobs in the Tucson region. The Coalition’s membership includes Arizona Builders Alliance, Alliance of Construction Trades, Marana Chamber of Commerce, Metropolitan Pima Alliance, Northern Pima County Chamber of Commerce, Safe and Sensible Water Committee, Southern Arizona Homebuilders Association, Southern Arizona Leadership Council, Tucson Association of Realtors, Tucson Metropolitan Chamber of Commerce, Tucson Utilities Contractors Association, Tucson Hispanic Chamber of Commerce, *and recently added the Arizona Multi-Housing Association*. The member organizations recognize the importance of water to our local and statewide economy, and have organized to actively engage policymakers on critical water management issues.

The Coalition is encouraged by the fact that you have delayed adoption of the Phase 2 Report to carefully consider each of the policy recommendations. We have reviewed the Phase II Report and evaluated Staff’s individual recommendations. Our full evaluation of the recommendations was submitted at the January 12<sup>th</sup> meeting and it is one of several previous submittals we have attached for your review. You will note that there are 25 recommendations that we support, 14 that we oppose, and 17 that we have not taken a position. Coalition members have additional concerns with the tone and content included in narrative portions of Staff’s report.

Given the outstanding concerns of many individuals and groups in our community, we ask that you delay formal adoption of Staff’s policy recommendations until you have been provided more detailed information about the costs and implications of specific recommendations contained in the report. We believe that the current proposal to create a more detailed action plan to implement the recommendations—including a timeline, deliverables, costs, roles and responsibilities—should be completed and approved by Mayor & Council prior to formal endorsement of any of Staff’s policy recommendations. It is our sincere hope that additional analysis and vetting of the recommendations will result in substantive changes that improve the Phase II Report.

Above all else, the Coalition asks Mayor & Council to focus on critical questions about how Staff’s recommended policy directives harm or help: job creation, near-term economic and fiscal conditions, and the long-term economic development and security of the community. We ask that Mayor & Council focus specifically on policy recommendations regarding finalization of the Conservation Effluent Pool, evaluation of the City’s Obligated to Serve Policy, and helping to bring together a truly regional water planning process. Each of these areas of concern has a tremendous impact on the City’s near- and long-term viability.

Sincerely,

Tucson Regional Water Coalition



# Tucson Regional Water Coalition

Prosperity - Sustainability - Community

January 11, 2010

Arizona Builders Alliance

Alliance of Construction Trades

Marana Chamber of Commerce

Metropolitan Pima Alliance

Northern Pima County Chamber of Commerce

Safe and Sensible Water Committee

Southern Arizona Home Builders Association

Southern Arizona Leadership Council

Tucson Association of Realtors

Tucson Metropolitan Chamber of Commerce

Tucson Utility Contractors Association

Tucson Hispanic Chamber of Commerce

Pima County Board of Supervisors and City of Tucson Mayor & Council,

The Tucson Regional Water Coalition (“the Coalition”) is a group of business and trade organizations collectively representing over 250,000 jobs in the Tucson region. The Coalition’s membership includes Arizona Builders Alliance, Alliance of Construction Trades, Marana Chamber of Commerce, Metropolitan Pima Alliance, Northern Pima County Chamber of Commerce, Safe and Sensible Water Committee, Southern Arizona Homebuilders Association, Southern Arizona Leadership Council, Tucson Association of Realtors, Tucson Metropolitan Chamber of Commerce, Tucson Utilities Contractors Association, and Tucson Hispanic Chamber of Commerce. The member organizations recognize the importance of water to our local and statewide economy, and have organized to actively engage policymakers on critical water management issues.

The Coalition has closely monitored and when able participated in the City/County process. Our efforts to engage and contribute to the process have included regular attendance of Oversight Committee meetings, formal correspondence on key issues, a presentation during Phase I of the Coalition’s foundational principles, the Phase II white paper and panel discussion on the economic value of water, as well as several meetings with City and County staff. The Coalition’s participation has consistently focused on: 1) establishing an inclusive and transparent regional planning process; 2) recognizing the importance of water to regional economic growth and security; and 3) creating high-quality information to rationalize dialogue and decision-making.

We have reviewed the Phase II Report and evaluated Staff’s individual recommendations. Evaluating the report on its merit, there are 25 recommendations that we support, 14 that we oppose, and 17 that we have not taken a position. Our full evaluation of Staff’s recommendations is provided as an attachment. We have additional concerns with the tone, content and general direction of narrative portions of Staff’s report. In light of our outstanding concerns, we ask that the City and County’s elected bodies defer formal adoption of the draft resolution and report. However, if the City and County choose to accept the Phase II Report into the record at this time, the Coalition asks that any resolution or motion include the following amendment:

*Now therefore, be it resolved that the Pima County Board of Supervisors and the City of Tucson Mayor and Council hereby accept into the record the City/County staff and Oversight Committee recommendations as set forth in the Phase II Final Report. All portions and sections of Staff’s report that are not numbered recommendations shall not be used to provide policy guidance and are not endorsed by the Pima County Board of Supervisors and City of Tucson Mayor and Council.*

Additionally, the Coalition evaluated the Oversight Committee's principles and recommendations. We believe the Oversight Committee's work provides additional direction that must be considered before moving forward on a number of Staff's recommendations. If the City and County choose to accept the Phase II Report into the record at this time, the Coalition asks that any resolution or motion include the following amendments:

*Now therefore, be it resolved that the Pima County Board of Supervisors and the City of Tucson Mayor and Council, in support of Oversight Committee principles and recommendations set forth in the Phase II Final Report, direct City and County Staff to:*

- 1) *Manage water with due consideration to its economic value and importance to regional economic development, studying all costs and benefits of water and wastewater policies in order to establish baseline facts concerning the net outcomes of all policy options or projects under consideration. This shall include a determination of the cost to replace water entitlements proposed for reallocation to environmental restoration prior to moving forward on Staff recommendation B.5.1 (Conservation Effluent Pool), and plans to finance acquisition of replacement supplies such that costs are shared by all beneficiaries.*
- 2) *Take a regional approach to water and wastewater in the Tucson AMA, committing resources to ensure a regional process is convened immediately. The regional process shall involve all jurisdictions, private water utilities, and other stakeholders in deliberations, and shall be similar to the RTA model. The regional process shall be led by a consortium of non-governmental entities and include technical assistance from Pima Association of Governments, Arizona Department of Water Resources, and Central Arizona Water Conservation District.*
- 3) *Conduct analysis outlined in Staff's recommendations A.3.1 and A.3.2 immediately to determine which "sub-regions" are appropriate to extend Tucson Water infrastructure to provide water service. Analysis shall be timely, address equity, and be updated periodically. Analysis shall focus specifically on near-term economic and fiscal benefits associated with extending service to commercial and industrial parcels located within 1/2 mile of existing infrastructure, as well as the implications of denying service. Following completion of the analysis, the City shall adopt a formal policy regarding extension of water service outside the "obligated area" and it shall replace the current interim policy.*

The Coalition is encouraged by the regional nature of many recommendations proposed by the Oversight Committee and Staff. We are hopeful that the much anticipated regional process will move forward quickly. The Coalition has consistently voiced concerns regarding the limited participation rights granted impacted parties during Phases I & II. Cooperative regional water planning is a central element to our community's economic development efforts, and sends a positive message to those looking to invest and/or relocate in the Tucson region. We strongly recommend the City and County commit to a truly cooperative process focused on maximizing economic benefits derived from use of the region's available water supply.

Sincerely,

Tucson Regional Water Coalition



# TUCSON REGIONAL WATER COALITION

December 1, 2009

Dear City/County Study Oversight Committee and Staff,

Arizona Builders Alliance

Alliance of Construction  
Trades

Marana Chamber of  
Commerce

Metropolitan Pima Alliance

Northern Pima County  
Chamber of Commerce

Safe and Sensible Water  
Committee

Southern Arizona Home  
Builders Association

Southern Arizona  
Leadership Council

Tucson Association of  
Realtors

Tucson Metropolitan  
Chamber of Commerce

Tucson Utilities  
Contractors Association

Tucson Hispanic  
Chamber of Commerce

The Tucson Regional Water Coalition has closely monitored and when able participated in the City/County process throughout Phases I & II. Our efforts to engage and contribute to the process have included regular attendance of Oversight Committee meetings, formal correspondence on key issues, a presentation of our foundational principles on water sustainability, and the Phase II white paper and panel discussion on the economic value of water. The Coalition's participation has consistently focused on: 1) establishing an inclusive and transparent regional planning process; 2) recognizing the importance of water to regional economic growth/security and managing it accordingly; and 3) creating high-quality information to rationalize dialogue and decision-making.

The Coalition recently reviewed the Draft Phase II Staff Report. We are encouraged by the regional nature of some goals and recommendations. Discrete references and recommendations to work collaboratively as a region to acquire new water supplies, to use GO Bonds to pay for reclaimed line extensions, to establish performance-based regional conservation goals, and a commitment to compare the cost-effectiveness of various conservation methods against that of various supply augmentation options are positive steps toward more sustainable regional water planning. However, there are several other areas the Coalition feels must be addressed before the report is finalized.

The Coalition has stressed the importance of economic analysis throughout Phases I & II. Use of economic analysis in water policy and planning is widely considered a best practice approach by industry associations such as the American Water Works Association, industry professionals, and academia. Economic analysis methods provide much needed transparency and quality data to inform policy decisions, and are a fundamental building block to sound water management. The current draft does include occasional references to the use of cost-benefit analysis, but there are major policy recommendations throughout the document that lack sound analysis.

For example, the draft document includes a strong endorsement of rainwater harvesting at a variety of scales and for a variety of purposes. While the Coalition does not oppose rainwater harvesting, these broad policy endorsements lack analysis of costs and benefits associated with a range of alternatives and a comparison against other supply augmentation strategies such as water right acquisition. We recommend adding qualifying language throughout the document, committing the jurisdictions to perform the proper analysis to determine the cost-effectiveness of rainwater harvesting as well as other water conservation measures and supply augmentation alternatives. Any sums of money exacted from various industries and segments of the community by new regulations or fees should be justified by thorough and thoughtful analysis of alternatives.

Similarly, the draft document includes extensive discussion of allocating water resources to environmental restoration. The Coalition generally supports policy that allocates water to the environment, provided the community is informed of the associated costs and benefits of all allocation decisions (i.e. the pending Conservation Effluent Pool). As outlined in the Coalition's white paper on the economic value of water, there are potentially significant opportunity costs and/or replacement costs associated with reallocating water from urban to environmental uses. Therefore, we believe the jurisdictions should provide the public with more information about the costs and benefits associated with individual restoration projects and prioritize projects based on a comparison of net benefits. Moreover, high priority restoration projects (defined as those with the greatest net benefit) should be compared to net benefits associated with a variety of urban uses before reallocation is decided.

Reallocation decisions must involve an informed community discussion about whether we are collectively willing to forgo the net benefits of alternative uses of water. The jurisdictions have not performed the analyses needed to initiate a legitimate policy discussion on reallocating water from urban to environmental uses. Until these analyses are performed and a community values discussion initiated, the Coalition recommends the jurisdictions add qualifying language throughout the document committing to perform the proper analysis to determine net benefits of all water allocation decisions—particularly those reallocating resources out of the urban water sector such as the Conservation Effluent Pool.

The Coalition believes that all water reallocation decisions should be project-specific and approved individually. That is, rather than setting aside 10,000 acre-feet of water for environment restoration—as contemplated by the Conservation Effluent Pool—each proposed restoration project should determine the annual water demand, the duration of supplemental water, a detailed description of project benefits, and a description of project costs (including any opportunity costs associated with reallocation). This process ensures the community evaluates critical reallocation decisions with full-knowledge of specific costs and benefits, and accurately determines whether the proposed project is the best use of the region's water supplies at that time.

Finally, the Coalition has consistently voiced concerns regarding the limited participation rights granted to impacted parties during Phases I & II. Exclusion of key regional stakeholders from deliberative processes during Phases I & II delayed and possibly impaired efforts to convene a truly regional water planning process. It is critical that the Phase II Report include a commitment by the City and County to help convene a regional process. Cooperative regional water planning is a central element to our community's economic development efforts, and sends a positive message to those looking to invest and/or relocate in the Tucson region. We strongly recommend the City and County commit to a cooperative process focused on maximizing regional net benefits derived from utilization of the region's available water supply.

Sincerely,

Tucson Regional Water Coalition

PHASE II City/County Staff Recommendations	Agree (25)	Disagree (14)	Explanation
Section A - Comprehensive, Integrated Planning			
<p>1.1 The City and County should require and incent new development and redevelopment projects to implement smart growth principles and concepts and contribute to a sustainable urban form including:</p> <ul style="list-style-type: none"> <li>• Mix of uses</li> <li>• Open space preservation</li> <li>• Higher densities/density by design</li> <li>• Housing choice</li> <li>• Transportation options</li> <li>• Access to jobs and services</li> <li>• Reduced water and energy consumption</li> <li>• Infrastructure efficiencies</li> </ul> <p>A variety of policy and legislative tools as well as incentives should be developed to implement these concepts including:</p> <ul style="list-style-type: none"> <li>• General and Comprehensive Plan Policies</li> <li>• Land Use Code changes</li> <li>• Other legislative actions</li> <li>• Incentives</li> </ul>	X		<p>Not enough time was spent on these issues during City/County Water Study to warrant detailed recommendations in these areas. Recommend deleting this section from the report and deliberate on these important issues in the Regional Visioning Process and/or during the updates to General Plan and Comp Plan.</p>
<p>2.1 The City and County should take steps to encourage growth and new development in areas that are within or adjacent to the existing built environment, are outside of the conservation land system, and are identified as most suitable for development which include the following:</p> <ul style="list-style-type: none"> <li>• Infill into the existing built environment (highest priority)</li> <li>• Within the Houghton corridor</li> <li>• Within the Southlands area</li> <li>• Within the Southwest area</li> </ul> <p>Revitalization of downtown as well as infill and reinvestment in the built-up areas of the community (inside and outside city limits) should be the highest priority for locating future growth in order to make use of existing infrastructure and minimize the consumption of raw land.</p>			<p>No position. Support identified growth areas. Restating those growth areas agreed upon by City and County is sufficient for discussion about urban form for this study. Should recognize that Marana, Oro Valley, and Sahuarita are also known “growth areas.”</p>

<p>Infill should be done in a manner that is economically, environmentally, and socially advantageous.</p> <p>A variety of policy and legislative tools as well as incentives should be developed to encourage growth in these locations including:</p> <ul style="list-style-type: none"> <li>• General and Comprehensive Plan Policies</li> <li>• Land Use Code changes</li> <li>• Other legislative actions</li> <li>• Differential impact fees</li> <li>• Incentives</li> </ul> <p>City and County staff should involve the public in discussion about location of growth and tools to direct growth to these areas as part of their updates to the City General Plan and County Comprehensive Plan.</p>			
<p>2.2 The City and County should influence the location of future growth through where infrastructure is built and public services are provided. The City and County should establish a joint land use/capital improvement planning staff team to plan for the timing, sequencing, location and funding of infrastructure and public services to serve identified growth areas. Financial and infrastructure planning should occur ahead of development pressures. For infill areas, policies should focus on planning for and funding needed investments and improvements that must go along with higher densities and redevelopment. The County has already begun an effort to inventory the planning related activities of its various public works departments, and this could be replicated for the City prior to a joint process getting underway. Updates to the City General Plan and County Comprehensive Plan should set forth policy that requires this process take place.</p>			<p>No position. Support financial and infrastructure planning to occur ahead of growth to facilitate absorption of growing population.</p>
<p>2.3 The City and County should influence the location of future growth through the acquisition of open space. With the support of voters, the County will continue funding the acquisition of natural areas for conservation, recreation, and the protection of water resources. Natural</p>		<p>X</p>	

<p>preserves assist in defining the urban form, as well as providing multiple benefits such as recreational opportunities, conservation of water resources and natural floodplain functions, and protection of scenic views. In some cases, purchasing land outright or through conservation easements is the most realistic way to preserve areas not suitable for development.</p>		
<p>2.4 The City and County should continue to work with PAG to do growth and urban form scenario modeling on a regional level (including Marana, Oro Valley, Sahuarita, South Tucson, the Tohono O’odham Nation, the Pascua Yaqui Tribe, the San Xavier District and others) similar to the modeling done for the City/County service area in the Growth and Urban Form technical paper. This work could help inform or be done in conjunction with the emerging regional visioning process and could help inform the City General Plan update and County Comprehensive Plan update. Ideally this analysis should also be done at the Southern Arizona and Sun Corridor scales.</p>	<p>X</p>	
<p>3.1 Outside of the Tucson Water Obligated Service Area, in unincorporated Pima County, the City and County should work together to conduct comprehensive water resource planning to identify sustainable water resources to serve these areas. Water resources should be looked at in a comprehensive manner with the goal of making efficient use of water and matching up sources with needs. This planning effort should address the use of potable, reclaimed, effluent, stormwater, rainwater, and graywater. The City and County should evaluate the life-cycle cost and triple bottom line of decentralized wastewater treatment versus centralized systems in light of energy demands and efficiencies, and integration with recharge and reclaimed water systems. As an example, the City and County should work cooperatively to explore the development and operation of reclaimed water systems and recharge facilities at the County’s sub-regional wastewater reclamation facilities.</p>	<p>X</p>	<p>Disagree with City’s interim policy regarding new service outside “obligated area.” Agree that City and County should identify those agreed upon “growth areas” and/or “infill areas” that make sense to extend Tucson Water infrastructure.</p>
<p>3.2 The above described planning effort should help inform future City considerations of extending the obligated service area. These expansion</p>	<p>X</p>	<p>Disagree with City’s interim policy regarding new service outside “obligated area.” Agree that City and County should identify those</p>

<p>decisions should be done on a sub-regional basis (vs. a parcel-by-parcel basis) in advance of specific water service requests. Any decision to expand the obligated area should be formalized through Mayor and Council policy. The following factors should be taken into account in making policy decisions regarding expansion of the obligated area within specific sub-regions.</p> <ul style="list-style-type: none"> <li>• Suitability of growth area</li> <li>• Affect of extensions on future water resource needs for the City's existing obligated area</li> <li>• Fiscal sustainability of development and potential for future annexation</li> <li>• Appropriateness of timing/phasing of development</li> <li>• Economic impact/benefits</li> <li>• Quality and sustainability of urban form</li> <li>• Environmental implications of development</li> <li>• Environmental implications of not providing water service</li> <li>• Social equity and social justice considerations.</li> </ul>		<p>agreed upon "growth areas" and/or "infill areas" that make sense to extend Tucson Water infrastructure. Policy must be developed to take us beyond an "Obligated to Serve" policy designed to force annexation. Must understand near-term economic and financial impacts of denying service to parcels in regional growth areas and/or those parcels that are clearly "infill". Must also consider the environmental impacts associated with groundwater pumping that are likely to occur if service is denied. The bar to qualify for Tucson Water service must be lowered</p>
<p>3.3 In addition to the comprehensive, long range planning efforts described above, the City and County should continue to assess and track the impact of individual developments on water resources:</p> <ul style="list-style-type: none"> <li>• The County should continue to implement the recent amendment to the Water element of the Comprehensive Plan providing the Board of Supervisors with the necessary water resources information concerning individual development requests.</li> <li>• The City should continue to implement the "water checkbook" method of tracking and communicating to the Mayor and Council how much renewable water Tucson Water has available to support proposed new developments or businesses.</li> </ul>	<p>X</p>	<p>County Water Resource Element should be rewritten in 2010 Comp Plan Update to reflect unwillingness of City to extend service, to recognize effluent as a renewable water supply, to delete term "renewable and potable", to recognize CAGR membership as renewable water supply, to recognize that every water provider in the Tucson AMA (including Tucson Water) withdraws water outside the area of hydrologic impact where water is recharged.</p>
<p>3.4 The City should continue to pursue discussions with other water providers regarding potential for wheeling and/or recharge agreements. As an example, Tucson Water and Metro Water/Hub should discuss the potential for wheeling of a portion of metro's CAP allocation to Metro/Hub through Tucson Water's integrated potable water distribution system at a cost of service price, in order to reduce</p>	<p>X</p>	<p>Consistent with Coalition Principle "Support shared use of community infrastructure through cost-effective wheeling agreements..."</p>

Metro/Hub's groundwater pumping in the immediate area.						
3.5 The City and County should work together with other jurisdictions to support regional solutions to address the hydrological disconnect between where water is being pumped and where it is being replenished.	X		Consistent with Coalition Principle "Support shared use of community infrastructure through cost-effective wheeling agreements..."			
4.1		Future development should be evaluated in terms of fiscal sustainability from both the capital (initial construction of infrastructure) and operating (ongoing public services and maintenance of infrastructure) perspectives to ensure that new development is self-sustaining and not subsidized over the long term by pre-existing residents and businesses.	X	Anti-growth tone that fails to recognize significant economic and financial benefits associated with population growth (see multiplier effect), including job creation, increased wages, increased sales tax, increased property taxes, increased income tax, etc. Also, fails to recognize significant impact fees and hook-up fees currently in place to ensure that new residents pay proportionate share of the costs.		
4.2		The Tucson Water Department and the Regional Wastewater Reclamation Department should continue managing their water/wastewater infrastructure capital improvement programs in a manner that is consistent with the latest nationally accepted industry best practices and continue to ensure that each year's water/wastewater Financial Plan adequately and demonstrably provides mechanisms so that "growth pays for growth."		No position. However, does seem to suggest that growth does pay for growth through currently adopted impact fees and hook-up fees.		
Section B – Respect for the Environment						
1.1		The City and County continue to preserve existing riparian areas to the maximum extent possible through land acquisition, regulatory land use controls that limit encroachment into floodplains and riparian habitat, and education and outreach.	X	Use of "to the maximum extent possible" is too strong and fails to meet sustainability criteria of balancing competing interests and/or tradeoffs. While protection of riparian habitat is appropriate (especially through land acquisition), environmental protection needs to be balanced against economic needs such as increased land utilization in urban areas. City and County floodplain and riparian codes should have different levels of protection for areas targeted for urbanization (or that are already urbanized) versus those sensitive environmental areas targeted for protection.		
1.2		The City and County should evaluate the effectiveness of programs and policies, within their respective jurisdictional areas and water service areas, regarding the protection of groundwater-dependent and hydro-	X	Focus needs to be on providing cost-effective alternatives to groundwater use for those who are near environmentally sensitive areas (i.e. wheeling agreements or simply providing service).		

<p>riparian areas from groundwater withdrawal and surface water diversions.</p> <p>The city and county should promote changes to state law regarding drilling and pumping of wells within and near shallow groundwater ecosystems.</p>			<p>Environmental benefits are regional in nature and costs should be shared by all beneficiaries, which could mean subsidies or cost-sharing to take users off of groundwater (see use of GO Bonds for reclaimed line extensions).</p>
<p>2.1 The City and County should work with stakeholders to develop a shared regional policy for addressing those regulatory compliance projects that require water for short-term or long-term (permanent or seasonal) establishment.</p>	X		<p>Disagree with linking regional water supplies to Federal Section 10 Permits (HCPs). More cost-effective to purchase open space for mitigation credits than to mitigate by way of riparian restoration that are more costly. Effluent supplies dedicated for environmental restoration and reallocated from municipal providers' portfolio should be replaced and costs should be shared by all beneficiaries through volumetric fees on water and/or wastewater bills.</p>
<p>2.2 The City and County should work with stakeholders to develop a regional collaboration for riparian restoration. This effort should include exploring or continuing to pursue:</p> <ul style="list-style-type: none"> <li>• Enhancing the value of in-lieu mitigation funds received for compliance with local watercourse protection ordinances to fund restoration activities;</li> <li>• Opportunities to partner with non-governmental entities that operate mitigation banks and/or undertake restoration activities;</li> <li>• Continue to evaluate existing County and City-owned lands for suitability for environmental conservation and restoration;</li> <li>• Opportunities to secure grant funding for environmental restoration;</li> <li>• Partnering with experts to identify long-term water quality implications for restoration areas, such as the impacts of higher salinity of CAP, effluent, and reclaimed water.</li> </ul>	X		<p>Local watercourse protection ordinances should not be used to exact resources from projects in growth areas where urbanization is desired. Watercourse and riparian ordinances should be written with varying level of protection/requirements for growth areas versus environmentally sensitive areas.</p>
<p>2.3 The City and County should continue to work with ADEQ to develop water quality standards and designations specifically for habitat restoration.</p>			<p>No position.</p>
<p>3.1 The City and County should pursue cost-effective, multiple-benefit, broad scale public projects that utilize reclaimed water to accomplish</p>			<p>No position.</p>

<p>goals such as aquifer augmentation, riparian restoration, habitat protection, environmental enhancement, turf irrigation, and recreational opportunities in combination with flood control and stormwater management facilities, parks and trails, and water recharge and wastewater disposal activities. For example by:</p> <ul style="list-style-type: none"> <li>• Incorporating ecosystem restoration adjacent to wastewater treatment facilities;</li> <li>• Exploring ways for recharge facilities to support restoration;</li> <li>• Retrofitting existing large stormwater detention basins to support riparian habitat;</li> <li>• Including environmental restoration opportunities as a component in all new stormwater management projects, so that optimal amounts of stormwater are retained for reuse before being discharged to the respective stormwater conveyance systems; and</li> <li>• Incorporating, where possible, rainwater harvesting and ecological amenities into other public projects.</li> <li>• Development of a joint policy that incorporates rainwater harvesting, stormwater detention, non-potable water use, recreation, and ecological amenities to the extent feasible in Capital Improvement Projects budgets, especially in open space areas.</li> </ul>			
<p>3.2 The City and County should identify areas within the existing built environment characterized by an abundance of impervious surfaces and identify opportunities for additional stormwater management. This would have water quality, stormwater management, and environmental benefits. To accomplish this, the City and County would need to develop a plan that identifies site-specific locations and standards for implementing stormwater management projects.</p>			<p>No position.</p>
<p>4.1 The City and County should advocate for changes to state statutes to grant full recharge credits to the Secretary of Interior for effluent used to sustain the flows in the Santa Cruz River and the riparian corridor.</p>			<p>No position. However, support maximization of effluent for Assured Water Supply purposes. Specifically, support regional investment in constructed recharge facility in Santa Cruz to recharge effluent and receive 100% credit for Assured Water Supply. To the extent that effluent is used for environmental restoration and it reduces the supplies available for municipal and industrial use, those supplies</p>

<p>4.2 The City and County, and other regional partners, should develop a “Lower Santa Cruz River Management Plan” that would identify the most effective and sustainable means for using effluent and other renewable water supplies to support and enhance valuable habitat in the Santa Cruz River corridor.</p>			<p>should be replaced through acquisition of additional water rights and the costs of acquisition should be shared broadly by all beneficiaries through volumetric fee on water and/or wastewater bills. Use stormwater for restoration projects, which is most cost-effective supply for that purpose.</p> <p>No position. However, support maximization of effluent for Assured Water Supply purposes. Specifically, support regional investment in constructed recharge facility in Santa Cruz to recharge effluent and receive 100% credit for Assured Water Supply. To the extent that effluent is used for environmental restoration and it reduces the supplies available for municipal and industrial use, those supplies should be replaced through acquisition of additional water rights and the costs of acquisition should be shared broadly by all beneficiaries through volumetric fee on water and/or wastewater bills. . Use stormwater for restoration projects, which is most cost-effective supply for that purpose.</p>
<p>4.3 As part of the Management Plan, and building upon the Regional Flood Control District’s current cooperative efforts, the City and County should develop partnerships with other effluent rights holders and stakeholders to use our growing collection of pilot restoration projects to demonstrate their potential to maintain and enhance aquatic and riparian habitat along the Santa Cruz River. The City and County can then identify a portfolio of multi-purpose projects for long term implementation in the context of the Management Plan. For example, the emphasis should be on areas such as the reach between the Rillito and the Canada del Oro confluence, where stormwater flows are more concentrated.</p>			<p>No position. However, support maximization of effluent for Assured Water Supply purposes. Specifically, support regional investment in constructed recharge facility in Santa Cruz to recharge effluent and receive 100% credit for Assured Water Supply. To the extent that effluent is used for environmental restoration and it reduces the supplies available for municipal and industrial use, those supplies should be replaced through acquisition of additional water rights and the costs of acquisition should be shared broadly by all beneficiaries through volumetric fee on water and/or wastewater bills. . Use stormwater for restoration projects, which is most cost-effective supply for that purpose.</p>
<p>4.4 The City and County should incorporate into both in-channel and off-channel recharge facilities features which also use the water to support riparian and/or aquatic habitat.</p>			<p>No position. However, support maximization of effluent for Assured Water Supply purposes. Specifically, support regional investment in constructed recharge facility in Santa Cruz to recharge effluent and receive 100% credit for Assured Water Supply. To the extent that effluent is used for environmental restoration and it reduces the supplies available for municipal and industrial use, those supplies should be replaced through acquisition of additional water rights and</p>

<p>the costs of acquisition should be shared broadly by all beneficiaries through volumetric fee on water and/or wastewater bills. . Use stormwater for restoration projects, which is most cost-effective supply for that purpose.</p>			
<p>Do not finalize CEP until accurate accounting of specific costs and benefits—including opportunity costs—associated with reallocating effluent from municipal providers portfolios for environmental restoration. Also, To the extent that effluent is used for environmental restoration and it reduces the supplies available for municipal and industrial use, those supplies should be replaced through acquisition of additional water rights and the costs of acquisition should be shared broadly by all beneficiaries through volumetric fee on water and/or wastewater bills. . Use stormwater for restoration projects, which is most cost-effective supply for that purpose.</p>	<p>X</p>		<p>The City and County will finalize the IGA for the Conservation Effluent Pool (CEP), which will annually provide up to 10,000 acre feet of effluent for environmental enhancements. This agreement will be delivered to the City Mayor and Council and the County Board of Supervisors for review and approval.</p>
<p>The so-called Conserve to Enhance Program should be used instead of CEP—not in addition to it. Effluent should be reallocated for environmental restoration only once the community understands all costs and benefits and is willing to pay associated replacement and/or opportunity costs in order to enjoy benefits.</p>		<p>X</p>	<p>The City and County will work with stakeholders and other resource experts to link water conservation to the protection of future supplies and to environment preservation/restoration by identifying mechanisms to reserve water saved through conservation programs for specific environmental uses/projects. This will allow community members to directly contribute to environmental protection and enhancement as a result of their individual actions to reduce their use of potable water. It would also provide a mechanism to develop a water source, beyond the CEP, that can be dedicated to projects with an environmental benefit.</p>
<p>Section C – Water Supply</p>			
<p>Agree. Consistent with Coalition Principle “Collectively maximize purchase and underground storage of additional surface water and/or imported groundwater supplies, augmenting local groundwater supplies to further insulate the region from cyclical weather patterns”</p>		<p>X</p>	<p>As the ADD Water stakeholders’ process proceeds, local water providers and users should maximize opportunities to acquire ADD Water Supplies and explore options to finance these additional supplies when they become available.</p>
<p>Agree. Consistent with Coalition Principle “Collectively maximize purchase and underground storage of additional surface water and/or imported groundwater supplies, augmenting local groundwater supplies to further insulate the region from cyclical weather patterns”</p>		<p>X</p>	<p>All Municipal and Industrial priority CAP allocations will be vulnerable in times of severe shortage on the Colorado River. Therefore, Tucson Water should take the necessary steps to have additional, more reliable water resources to reinforce and buttress its CAP water allocation to serve growth in the existing built environment and yet undeveloped</p>

<p>areas of Tucson Water’s Obligated Service Area.</p>				
<p>1.3 The City and County should continue to jointly plan for the acquisition of additional supplies to maximize shared system efficiencies and to achieve their respective sustainability goals. These goals should collectively take into account social, economic, and environmental factors to ensure that all costs and benefits are taken into account.</p>	X		<p>Agree. Consistent with Coalition Principle “Collectively maximize purchase and underground storage of additional surface water and/or imported groundwater supplies, augmenting local groundwater supplies to further insulate the region from cyclical weather patterns” and</p> <p>Coalition Principle “Support shared use of community infrastructure through cost-effective wheeling agreements...to achieve greater integration, reliability, flexibility, and reliance on renewable supplies throughout the region.”</p>	
<p>2.1 The City and County should continue to balance the uses of effluent, dedicating it to the reclaimed system, to environmental purposes, and for aquifer augmentation/recharge credits.</p>			<p>No position. However, support maximization of effluent for Assured Water Supply purposes. Specifically, support regional investment in constructed recharge facility in Santa Cruz to recharge effluent and receive 100% credit for Assured Water Supply. To the extent that effluent is used for environmental restoration and it reduces the supplies available for municipal and industrial use, those supplies should be replaced through acquisition of additional water rights and the costs of acquisition should be shared broadly by all beneficiaries through volumetric fee on water and/or wastewater bills. Use stormwater for restoration projects, which is most cost-effective supply for that purpose.</p>	
<p>2.2 Continue to implement ROMP improvements as currently planned and budgeted.</p>	X			
<p>2.3 The City and County should remain vigilant about water quality by continuing efforts at source control, maintaining proactive system monitoring, conducting public outreach &amp; education, and staying abreast of research and regulatory developments related to emerging contaminants in water and wastewater systems.</p>			No position.	
<p>2.4 The City and County should evaluate the use of reclaimed water for particular sites with the goal of maximizing the community’s overall water resource portfolio by matching up the most effective and</p>	X		<p>Support maximization of effluent for Assured Water Supply purposes. Community should consider wheeling agreements and/or subsidies that reduce costs of reclaimed water to reduce groundwater</p>	

resource-efficient water source with a particular site and its needs.			dependency/use where there is a public benefit (i.e. recreation and/or environmentally sensitive areas).
2.5 Tucson Water and Pima County Wastewater should continue to assess the potential water supply benefits as well as the adverse consequences of expanded gray water use within their respective service areas.	X		
2.6 The City of Tucson and Pima County will continue encouraging rainwater harvesting on both residential, commercial, and government properties to defray the high costs associated with stormwater management, and to develop a new source of local, renewable water supply.		X	More research and analysis should be performed before broad endorsement of rainwater harvesting at a variety of scales. Recommend understanding the costs of rainwater harvesting as a supply alternative before considering additional benefits of stormwater management. Need to have credible/sound/objective analysis on this subject before and understanding alternatives before jurisdictions either encourage or require.
3.1 Refine policy and regulations governing the accrual of groundwater credits to provide incentives to groundwater turf users proximate to reclaimed lines to convert to reclaimed water in lieu of pumping.	X		
3.2 Develop alternative operational and permitting strategies to achieve a Class A+ or equivalent water supply for the reclaimed system.			No position.
3.3 The City and County should continue to work with ADEQ and ADWR to develop water quality standards, permits and designations specifically for riparian projects.			No position.
4.1 Expand financing options, including considering the use of General Obligation Bonds to pay for extensions to the reclaimed system without relying solely on paying customers and revenue bonds.	X		Use of GO Bonds is appropriate for extensions of reclaimed system, especially where there is a public/regional benefit (i.e. supports regional environmental goals). Allows all beneficiaries to share associated costs.
4.2 Maintain the current policy that a private customer with a revenue source (e.g. golf courses, industrial) who can pay the full costs of reclaimed water should pay; explore options to encourage potential customers who currently have no financial incentive to join the system to join, such as phased-in rates and expanded potable water ratepayer subsidies.	X		Agree. Subsidies that result in public/regional benefit are appropriate and allow all beneficiaries to share associated costs.
4.3 Work to lower the costs of operating the reclaimed system through efficiency improvements.	X		

<p>4.4 Incorporate the consideration and evaluation of the use of reclaimed water in specific developments into the City and County development review processes.</p>		X	<p>Extension of reclaimed system should be initiated by applicant—not City and County review process. Reclaimed usage is primarily appropriate for large turf users or other large volume users. Not appropriate for individual residential users. Better for non-potable supplies with possible health concerns to be managed by landscape and/or irrigation professionals.</p>
<p>4.5 Tucson Water and Pima County will continue to evaluate opportunities to expand reclaimed water and remediated groundwater use to meet both municipal and environmental-enhancement supply needs.</p>			<p>No position. However, support maximization of effluent for Assured Water Supply purposes. Specifically, support regional investment in constructed recharge facility in Santa Cruz to recharge effluent and receive 100% credit for Assured Water Supply. To the extent that effluent is used for environmental restoration and it reduces the supplies available for municipal and industrial use, those supplies should be replaced through acquisition of additional water rights and the costs of acquisition should be shared broadly by all beneficiaries through volumetric fee on water and/or wastewater bills. Use stormwater for restoration projects, which is most cost-effective supply for that purpose.</p>
<p>4.6 The City and County should increase the amount of their effluent allocations used in the reclaimed system</p>			<p>No position. Support maximization of effluent for Assured Water Supply purposes. Community should consider wheeling agreements and/or subsidies that reduce costs of reclaimed water to reduce groundwater dependency/use where there is a public benefit (i.e. recreation and/or environmentally sensitive areas).</p>
<p>4.7 Identify, prioritize and pursue additional reclaimed customers based on the following criteria:</p> <ul style="list-style-type: none"> <li>• Proximity to existing reclaimed infrastructure</li> <li>• Cost to join the system</li> <li>• Energy, operating and maintenance costs</li> <li>• Potable and groundwater savings</li> <li>• Opportunity to mitigate environmental impacts of existing groundwater pumping</li> <li>• Turf areas that provide greatest public benefit</li> <li>• Availability of other water resource options</li> </ul>			<p>No position. Support maximization of effluent for Assured Water Supply purposes. Community should consider wheeling agreements and/or subsidies that reduce costs of reclaimed water to reduce groundwater dependency/use where there is a public benefit (i.e. recreation and/or environmentally sensitive areas).</p>
<p>5.1 Continue multi-pronged planning approach that includes diversification of water supplies, increased demand management, and development and maintenance of necessary infrastructure.</p>	X		<p>Agree. Consistent with several Coalition Principles.</p>

<p>5.2 Use scenario planning as a tool to assess the changing planning environment including the potential for extended drought or permanent climate change, and other types of uncertainties, such as new technology, changing regulations, or altered patterns of development in the Tucson area.</p>	<p>X</p>		<p>Agree. Consistent with Coalition Principle “Concerns regarding evolving and/or uncertain conditions should be addressed through iterative risk assessments and decision-making processes, systematically reevaluating risk according to potential financial impact to the region and probability of occurrence.”</p>
<p>Section D – Demand Management</p>			
<p>1.1 The City and County partner with ADWR and other stakeholders in collecting uniform data on existing water use patterns to identify conservation potential and to support development of water efficiency and conservation goals. Measures are communicated through the coordinated information campaigns to ensure widespread public awareness of progress towards goals. Potential water use trend evaluation elements include:</p> <ul style="list-style-type: none"> <li>• indoor versus outdoor water use,</li> <li>• lot size</li> <li>• persons per household</li> <li>• commercial and industrial accounts</li> <li>• non-potable use vs. potable use</li> </ul>	<p>X</p>		<p>Agree. Consistent with Coalition Principle “Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent...”</p>
<p>1.2 The City of Tucson and Pima County continuously improve the effectiveness of their conservation programming through integrated resource planning techniques, including triple bottom line analysis and evaluation of cost / benefit economic thresholds. Results of evaluations are used to revise programs as needed.</p>	<p>X</p>		<p>Agree. Consistent with Coalition Principle “Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent...”</p>
<p>1.3 In the face of uncertainty related to drought and climate change, the City and County should employ an adaptive planning approach that incorporates the following:</p> <ul style="list-style-type: none"> <li>• Bringing experts together to brainstorm current and future vulnerabilities under range of scenarios;</li> <li>• Scenario planning as a tool to assess the changing planning environment including the potential for extended drought or permanent climate change;</li> </ul>	<p>X</p>		<p>Agree. Consistent with Coalition Principle “Concerns regarding evolving and/or uncertain conditions should be addressed through iterative risk assessments and decision-making processes, systematically reevaluating risk according to potential financial impact to the region and probability of occurrence.”</p>

<ul style="list-style-type: none"> <li>• Periodic review and frequent updates to the Drought Response Plans to incorporate the latest information on drought and climate change;</li> <li>• Integrating climate change impacts over time to re-define “normal conditions” when assessing drought;</li> <li>• Evaluation and consideration of the social and financial impacts of drought on the utilities and their customers and ways to address them;</li> <li>• Employing conservative approaches and a multi-pronged preparedness strategy that includes diversification of water supplies, demand management, and development and maintenance of necessary infrastructure to preserve options or the future.</li> </ul>			
<p>2.1 The City of Tucson and Pima County should evaluate options for working with regional stakeholders to establish common, measurable water efficiency* and water conservation goals community-wide. Although the City and County can initiate the dialogue, ultimately this goal needs to be advanced through a regional process. Such a process might be convened through an existing regional entity such as Pima Association of Governments (PAG), Southern Arizona Water Users Association, the University of Arizona Water Resources Research Center, and/or Water CASA.</p>	X		<p>Agree. Consistent with Coalition Principle “Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent...”</p>
<p>2.2 Building from the community-wide water efficiency goals, City of Tucson and Pima County, in cooperation with regional stakeholders, develop a menu of water efficiency and water conservation options such as targeted strategies, policies, actions, regulations, and programs.</p>	X		<p>Agree. Consistent with Coalition Principle “Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent...”</p>
<p>3.1 A joint City/County staff team, working with stakeholders, reviews their existing water conservation regulations for consistency with water efficiency goals. Where appropriate, the team recommends new requirements with a priority focus on landscape requirements that maximize non-potable water sources and water harvesting techniques. The team also evaluates the feasibility and benefits of</p> <ul style="list-style-type: none"> <li>• Developing joint landscape, building and zoning standards that increase the potential for on-site capture, storage and use of</li> </ul>		X	<p>All water conservation and management decisions should be subject to rigorous cost analysis that compares alternatives before finalizing decisions. This recommendation does not appear to be supported by analysis.</p>

<p>rainwater. Incentives to residents, Home Owners Associations and builders should be considered (<i>this is further described under Goal 4, Recommendation 4.1</i>)</p> <ul style="list-style-type: none"> <li>• Updating standards for high efficiency toilets.</li> <li>• Incorporating the concepts of structured plumbing including trunk, branch twig piping systems, and pipe insulation into the plumbing code.</li> <li>• Developing common green building standards</li> <li>• Continuing to coordinate the review and update drought ordinances</li> <li>• Explore the possibility of requiring new facilities funded by County or City bonds to maximize LEED Silver water conservation credits.</li> </ul>			
<p>4.1 The City and County, working in cooperation with regional stakeholders, should gather public input regarding water efficiency measures and goals and consider it in the planning and decision making process. An initial step should be to define a list public opinion survey questions to explore public perceptions of quality of life trade offs associated with water efficiency measures and preferred strategies to achieve shared goals. Methods for gathering public input on these questions should also be explored.</p>		X	<p>Agree. Consistent with Coalition Principle “Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent...”</p>
<p>4.2 The City of Tucson and Pima County should explore the feasibility and benefits of consolidating existing programs and fostering regional approaches and partnerships for advancing water conservation and drought education, communications, pilot projects, and training.</p>		X	<p>Agree. Consistent with Coalition Principle “Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent...”</p>
<p>5.1 The Pima County Regional Flood Control District in cooperation with the City of Tucson and other regional stakeholders develops design guidelines/standards to maximize the potential for use of stormwater at the neighborhood scale.</p> <p>Supporting vegetation using harvested stormwater will eliminate the need for some landscape watering. Stormwater flow paths can be depressed to encourage the potential for infiltration and native vegetation can be planted that will thrive in these depressed flow paths. Such a strategy will have the additional benefit of reducing flood peaks</p>	X		<p>More research and analysis should be performed before broad endorsement of rainwater harvesting at a variety of scales. Recommend understanding the costs of rainwater harvesting as a supply alternative before considering additional benefits of stormwater management. Need to have credible/sound/objective analysis on this subject and understanding of alternatives before jurisdictions either encourage or require.</p>

<p>and improving stormwater quality. To accomplish this, the City and County will review existing policies and regulations and:</p> <ul style="list-style-type: none"> <li>• Identify opportunities to increase the incidence of water harvesting in private developments through new or expanded incentives and improved consistency between City and County requirements;</li> <li>• Evaluate how development standards and HOA regulations may need to be modified to accommodate this strategy;</li> <li>• Develop retention/detention standards that allow these areas to be better utilized as mini-restoration sites, including maintenance standards and siting of basins within a development/project; and</li> <li>• Develop restoration standards that encourage the creation of higher-value habitat areas without sacrificing the retention/detention function of the basins.</li> </ul>		
<p>5.2 The Pima County Regional Flood Control District, in cooperation with the City of Tucson, continues to conduct research and analysis on estimated volumes of harvested rainwater available at the lot scale and costs and benefits of water harvesting as a source of additional water supply and as a stormwater management tool.</p>	<p>X</p>	<p>More research and analysis should be performed before broad endorsement of rainwater harvesting at a variety of scales. Recommend understanding the costs of rainwater harvesting as a supply alternative before considering additional benefits of stormwater management. Need to have credible/sound/objective analysis on this subject and understanding of alternatives before jurisdictions either encourage or require.</p>



## TUCSON REGIONAL WATER COALITION

Arizona Builders Alliance

August 17, 2009

Alliance of Construction  
Trades

Marana Chamber of  
Commerce

City/County Study Oversight Committee:

Metropolitan Pima Alliance

Northern Pima County  
Chamber of Commerce

Safe and Sensible Water  
Committee

Southern Arizona Home  
Builders Association

Southern Arizona  
Leadership Council

Tucson Association of  
Realtors

Tucson Metropolitan  
Chamber of Commerce

Tucson Utilities  
Contractors Association

Tucson Hispanic  
Chamber of Commerce

Please accept the Tucson Regional Water Coalition's policy paper titled *Water as an Economic Resource*. As the title suggests, we believe that application of economic principles, methods, and instruments will lead to more informed water policy in the Tucson AMA. This paper is the product of the Coalition's yearlong research and interest in the internationally recognized concept of managing water as an economic good. The paper aims to introduce fundamental water economics concepts and highlight their applicability and usefulness in local policy discussions.

Several University of Arizona professors with expertise in the fields of water economics and water markets reviewed the paper and provided comments. Special thanks to George Frisvold, Carl Bauer, and Bruce Billings for their assistance in writing this paper. Similarly, outlines and drafts of the paper were distributed to the Coalition's membership for review and comment throughout the writing process. We have attempted to address all comments and incorporate recommended changes. The final paper is truly a collaborative effort and we hope it is a positive contribution to the Phase II report.

Many of the concepts explained in the paper were first introduced in the Coalition's *Principles of Sustainable Water Resource Management* submitted during Phase I of the City/County Study. We continue to rely on the sustainability principles to guide our efforts as well as our on-going evaluation of the City/County Study. We encourage the Oversight Committee to review those principles as you begin drafting policy language for the Phase II report. We appreciate the opportunity to contribute this policy paper and look forward to hearing its concepts discussed by the Committee.

Thank you,

Tucson Regional Water Coalition

# Water as an Economic Resource

Submitted by the Tucson Regional Water Coalition

## ABSTRACT

*Few will disagree that fresh water is a relatively scarce resource in many locations throughout the world, meaning supplies are (or will be) insufficient to meet all competing uses. Consequently, government agencies are increasingly looking to economically-minded water policies to achieve efficient use and allocation of available supplies. This is particularly relevant to rapidly growing arid and semi-arid regions with increasing demands across multiple water use sectors—municipal, industrial, agricultural, and environmental. Economically efficient allocation maximizes the general welfare or net benefits enjoyed in utilization of a community's water resources. This is achieved by allocating water to highly valued uses and away from uses that hold less value to the community. This paper will show how economics provides invaluable principles, methods, and instruments to understanding how communities can maximize the net benefits derived from available water supplies. We argue that economics' fundamental concern with allocating scarce resources makes it uniquely qualified to provide water policy debates with baseline facts about all associated costs and benefits of alternative uses, leading to more informed, rational allocation of arguably our most precious resource.*

## I. Introduction

In 1992, the International Conference on Water and Environment in Dublin, Ireland reached consensus regarding an emerging global water crisis and the need to reform water management in both developed and developing countries alike. Participants adopted a policy statement and principles known as *The Dublin Statement on Water and Sustainable Development* (ICWE, 1992). The globally applicable statement addressed water scarcity, misuse of water, and the rising number of water-related conflicts, and proposed a series of principles and actions to confront these challenges.

The Dublin Statement's most frequently cited recommendation is that water should be treated as an economic good: "Water has an economic value in all its competing uses and should be recognized as an economic good" (ICWE, 1992). Today, treating water as economic good or economic resource (Briscoe, 1996) is a generally accepted principle among the international water world. However, the meaning and intent of this principle has been rigorously debated in the literature and among water professionals over the past decade and a half (Bauer, 2004; Bauer, 2004b; Briscoe, 1996; Briscoe, 1997; Hanemann, 2006; Rogers et al, 1996; Rogers et al 2002; Savenije et al, 2002).

Those that accept the principle of *water as an economic good* generally fall along an ideological spectrum that ranges from a strict or narrow interpretation of the concept to an increasingly broader view (Bauer, 2004). The narrowest interpretation (often held by traditional neoclassical economists) believes efficiency would be best achieved if water rights were traded in well-functioning markets as a purely private commodity, subject only to forces of

supply and demand. However, as one moves along the spectrum, a greater number of economic principles, methods, and instruments are seen as acceptable to understanding how to achieve a more economically efficient use and allocation of water resources. These broader conceptions of water as an economic resource do not necessarily discredit water markets (albeit under optimal conditions), but view the tool box to improve economic efficiency as somewhat larger. A broader conception might be critical of the ability to create truly well-functioning water markets, and yet acknowledge the efficiency gains likely achieved from voluntary “market” transfers where water rights are traded from a low value use such as agriculture to a higher value urban use.

A slightly broader view of acceptable economic instruments might extend to allocation via retail pricing of water. Setting prices according to water’s economic value—like well functioning markets or even spot market transfers—will result in reallocation of resources from lower value uses to higher value uses, and thus efficiency or welfare gains (Agthe et al, 2003; Rogers et al, 1996; Rogers et al, 2002). Pricing water according to its economic value shares ideological space and is generally compatible with other quantitative economic analysis methods such as Cost-Benefit Analysis and Cost-Effectiveness Analysis, which serve to inform decision makers of the relative economic efficiency of policy alternatives in administrative allocation processes and other water management decisions. The broadest views are of those in the field of institutional economics that expand acceptable methods to include more interdisciplinary, qualitative analysis, attempting to place economic efficiency in the context of cultural, historical, political, and legal realities (Bauer, 2004).<sup>1</sup> These so-called “broad” views are most compatible with an administrative or legislative allocation system.

We support a broad interpretation of water as an economic resource. However, this paper has a somewhat narrower scope, focusing on the core issues considered and tools used in the analysis of economic efficiency as the primary objective in water resource management and allocation. While we propose use of economic efficiency as the central criterion in water policy debates, pure technocratic economic analysis is not a substitute for integrated, interdisciplinary, deliberative processes where a whole range of hard to quantify and/or monetize social, cultural, political, legal and environmental factors are considered by key stakeholders.

## **II. Economic Principles, Methods, and Instruments to Improve Efficiency**

As water becomes scarcer in any region or basin, efficient allocation among competing users is increasingly important. Economically efficient allocation maximizes the general welfare or net benefits enjoyed in utilization of a community’s water resources. In practice, this is achievable by allocating water to highly valued uses and away from uses that hold less value to the community. There are three distinct and widely recognized allocation methods: 1) governmental administrative or legislative processes; 2) retail pricing that includes economic costs such as opportunity cost and externalities; and 3) markets in tradable water rights (Rosegrant and Binswanger, 1994). All three allocation processes can improve economic

---

<sup>1</sup> For more complete discussion and summary of the different perspectives on what it means to treat water as an economic good see Bauer, 2004, pages 6-30; Hanemann, 2006; Savenije and van der Zaag, 2002.

efficiency or the net benefits derived from available water resources—each may be more or less suitable depending on the context.

The use of markets in tradable water rights to achieve efficient allocation has relatively limited applicability to the City/County Water Study. For the purposes of this study, the description of water markets is primarily included to introduce key concepts such as opportunity cost and transfers of water based on a willingness to pay to accrue future benefits derived from resource utilization. Understanding water markets or market-based transfers also provides good conceptual information for discussions regarding acquisition of additional supplies to meet future demands in the Tucson AMA.

### ***Water Markets as an Allocation Method***

Economists have traditionally supported allocation of scarce resources via markets (Rosegrant and Binswanger, 1994). Support is typically predicated on the notion that the property rights over said resources are exclusive, transferable, enforceable (like other commodities) and transaction costs (such as those associated with obtaining necessary legal approvals) are low or preferably zero. In reality, water rights transact relatively infrequently in most places; when they do, it is most often in environments where these conditions are not perfectly in place. Still many economists continue to support policies encouraging markets in tradable water rights, particularly in areas where water is scarce relative to demand, where economic growth is occurring, and lower value uses such as agriculture hold much of the available supply.<sup>2</sup> Even where conditions are not perfect, market-based transactions typically lead to efficiency or welfare gains through voluntary transfers from lower value users to higher value users who demonstrate a “willingness to pay” to accrue future benefits derived from use of the resource. These transfers can occur within and across water use sectors such as municipal, industrial, agricultural, and environmental. The agricultural sector seems to be involved with the greatest number of transfers—between two farmers, between farmers and environmental groups like land and water trusts, from farmers to municipal providers, etc.

Literature on markets in tradable water rights is extensive, outlining a broad range of pros and cons in theory and in practice (Young, 1986; Saliba and Bush, 1987; Smith, 1988; Colby, 1990; Rosegrant and Binswanger, 1994; Bauer, 1997; Agthe et al, 2003; Bauer, 2004; Bauer, 2004b; Brewer et al, 2007; Glennon and Pierce, 2007). Many praise markets in tradable water rights for their ability to force rights holders to face opportunity costs and the fluidity in which markets convey information about supply and demand through price signals (Briscoe, 1996). The most common critique of water markets is the high-degree of market failures, which reduce or negate efficiency/welfare gains. An often-cited market failure is the inability to internalize or capture externalities in a market price.

---

<sup>2</sup> For examples of locations where water rights transact regularly see Chile’s Los Andes Province (Bauer, 1997) and Colorado’s Big Thompson Project. A considerable challenge to facilitating transfers is the availability of infrastructure to physically move water from one place of use to another. The above referenced locations have the necessary canals and/or reservoirs to convey supplies, likely contributing to the number of water rights transactions.

The concept of opportunity cost is critical to an understanding of water as an economic resource and the role of markets in efficient allocation. The relationship between agricultural and urban uses in a basin where scarcity exists illustrates the concept. The value of water to urban users (measured by their collective maximum willingness to pay for the use of the resource) is often an order of magnitude or ten times greater than the value of water in agricultural uses (Briscoe, 1996). If the economic benefits for a farmer to use water in crop production and sale are 'X', and the economic benefits for the same water used to support a multitude of economic activities in a city are '10X', then the farmer will be induced to sell his water rights to a municipal provider or other urban uses such as industrial. The fact that urban users put the water toward uses that produce a significantly greater economic return or benefit is what drives their willingness to pay much more. Briscoe states: "if the user values the water less than it is valued by the market, then the user is induced to sell the water. This is the genius of the water market approach—it ensures that the user will in fact face the appropriate economic incentives" (Briscoe, 1996).

The "economic incentives" Briscoe refers to is the opportunity cost. The farmer (and society) experiences economic loss or opportunity cost, if, under the above conditions the water produces crops instead of going to urban users. The presence of markets or policies that encourage market transfers help water rights holders understand the value of water in alternative uses, realizing the different economic gains from either use or sale to willing buyers. Market-based allocation systems reduce the chance of undervaluation and misallocation between users, leading to welfare gains for the community in aggregate (Rogers et al, 1998).

While markets are praised for their ability to transmit signals regarding opportunity cost, they seldom capture or internalize so-called externalities unless policies are in place to force internalization. Externalities refer to either costs (negative externalities) or benefits (positive externalities) experienced by an entity that is not directly using or benefiting from the water in question. For example, a market transfer between a willing buyer and seller may have so-called "third party" environmental or economic impacts or externalities not accounted for in a market transaction. Failure to internalize these externalities in a water rights transaction reduces the resulting efficiency or welfare gains created by the transfer. Additionally, water is allocated in a manner far removed from the perfectly competitive environment required to achieve well-functioning markets. It is highly regulated and there are considerable institutional barriers to water transfers as well as potential for monopoly by large buyers and sellers. Removal of any one of these so-called distortions and movement toward a market-based allocation, will not necessarily improve welfare (Frisvold, 2009).

### ***Full Cost of Water***

Theoretically, a well-functioning water market with policies in place to take care of externalities will match demands with supplies to improve the economic efficiency of allocation over time. However, where use of markets is not applicable, not easily implemented, and/or not desired, pricing water according to its economic or scarcity value should also lead to reallocation to higher value uses and therefore efficiency gains. The paper titled *Water as a Social and Economic Good: How to Put the Principle into Practice*, explains full cost or economic retail pricing of water. It describes how economic or scarcity pricing leads to

allocation to most valuable uses, forcing end users to face opportunity cost and externalities in addition to the traditional “full supply” cost basis for water rates (Rogers et al, 1998). This full cost framework is generally compatible with other economic principles such as “Polluter Pays” and/or “User Pays”, where pricing ensures end users pay an amount equal to the benefit they receive and/or the impact their usage has on others (Rogers et al, 2002). This section will focus on components of full cost pricing, but the final section of the paper will show how principles like “polluter pays” can be put into practice.

*Full Supply Cost: O&M and Capital Charges*

Most water utilities set rates based on the full supply cost, which includes Operation & Maintenance (O&M) and Capital Charges. O&M expenditures include costs associated with the day-to-day operation of a water utility such as labor and energy, etc. O&M costs are the most straightforward and can easily be accounted for in a utility’s annual accounting receipts (Agthe et al, 2003). Capital Charges are those costs associated with delivery, storage, and treatment infrastructure, where costs are measured as the combination of all depreciation and the interest paid to service debt. There is some dispute whether Capital Charges should be “backward” or “forward” looking: “Traditional methods use a backward accounting approach and include only the costs associated with repaying the historical investments. Newer approaches use forward-looking accounting and consider the cost of replacement of the physical assets and the potentially increasing costs of new additions to the capacity of supply sources” (Agthe, 2003, p. 48).

*Full Economic Cost: Full Supply Cost + Opportunity Cost + Externalities*

Full supply cost described above is the foundational component of the full economic cost. However, stopping at full supply cost fails to account for the value of water as an economic resource to many competing uses. It fails to price water according to its relative scarcity, leading to over consumption by so-called lower value uses and economically inefficient allocation or “misallocation”. To achieve an economic pricing of water, one must also include opportunity cost and any externalities—to the extent that they exist (Figure 1) (Briscoe, 1996; Briscoe, 1997; Rogers et al 1998; Rogers et al, 2002; Agthe et al, 2003).

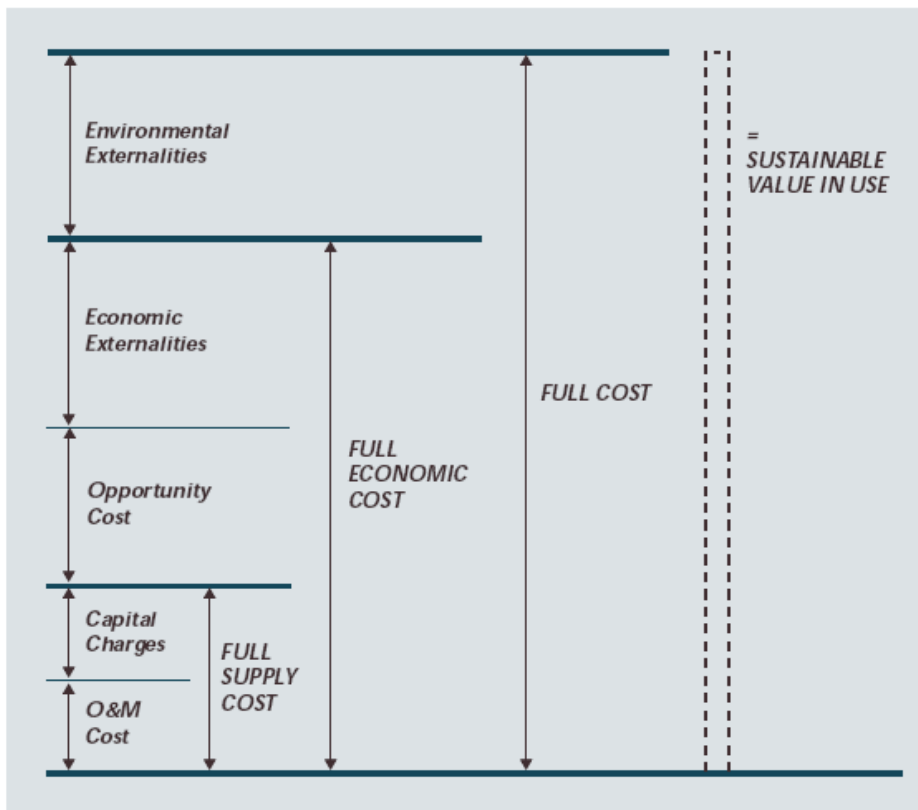
As noted, opportunity cost is an economic concept that describes the fact that if water is in fact scarce—meaning available supplies are insufficient to meet all competing demands—then social welfare losses occur when water is allocated to lower value uses instead of those capable of yielding greater economic returns. Opportunity cost represents the value of water in the best alternative use foregone. Said another way, opportunity cost can be understood within the context of an investment decision. If water is allocated to uses with a lower economic return or net benefit than what could have been achieved in an alternative use, then the community suffers the loss of higher returns that could have been achieved (i.e. benefits foregone). Again, this assumes available supply is insufficient to meet existing demand and the competing uses present are associated with varying economic returns. The fact that opportunity costs are not considered in a municipal provider’s rate setting processes may indicate available water supply is believed sufficient to meet all demands.

Briscoe notes markets’ ability to transmit information on opportunity costs with a degree of ease and flexibility that is not possible in a pricing or administrative allocation system. While

it is difficult (due to high degree of information required), it is not impossible to incorporate opportunity costs into retail water rates. Moreover, it is necessary to include opportunity costs if a community desires to use pricing to improve the economic efficiency of water allocation. However, two important factors should be reiterated. First, opportunity cost only exists where scarcity exists. That is, if the demands of all uses are met, then there are no potential benefits of an alternative use foregone and therefore no opportunity cost. Second, among urban users in the municipal and industrial sectors, the opportunity costs may be quite low and not worthy of much consideration in retail pricing for an urban water provider's rate structure (Briscoe, 1996).

One way to address externalities in a municipal provider's water rates is by including the cost of wastewater treatment. That is, before discharging wastewater into a stream or recharging into the aquifer, it must be treated to a high enough quality such that it does not degrade other users' water supply. If not treated appropriately, discharges impose costs on downstream users or other groundwater users who must pay more to remediate their degraded water supply. By treating the water before discharging it, users are in fact "internalizing" the externalities associated with their usage. Including wastewater charges in a municipal water providers' volumetric rates (instead of two separate bills for water and wastewater service) takes the concept one step further, sending the appropriate price signal to end users of the true cost of service.

Figure 1 – Full Cost Pricing



Source: Rogers et al, 1998

### *Cost Analysis Methods*

Cost-Benefit and Cost-Effectiveness Analyses are primary economic appraisal tools used to inform decision-makers of the relative efficiency of two or more alternatives. These methods are helpful in administrative allocation processes as well as other water management decisions such as conservation programs, supply augmentation strategies, environmental restoration projects, and countless others. Application of these methods is not a substitute for interdisciplinary, participatory decision-making processes. However, these tools provide invaluable baseline quantitative data to inform and rationalize water policy debates. They can help structure community dialogue around a common language, allowing for expression and comparison of diverse values in the same analytic framework.

#### *Cost-Benefit Analysis*

Cost-benefit or C/B Analysis compares the economic efficiency that would result from alternative allocation scenarios or water management policies. All benefits and costs of various alternatives are expressed in the common language of money, including “non-marketed” ecological and/or social costs and benefits that are not typically expressed in monetary terms. Additionally, since costs and benefits occur over different times in the future, a discount rate is applied to evaluate the net present value of costs or benefits in a common time or “day one” of the analysis. Once the discount rate is applied to monetized costs and benefits, the difference between the two represents the alternative’s net benefit or net present value. Net present values of one or more alternative policies or scenarios are compared against that of the “no action” or “business as usual” alternative. The alternative with the highest net benefit is deemed the most economically efficient option of those evaluated. Said another way, economic efficiency is based on maximizing the present value of the net benefit stream (AWWA, 2007; AWWA, 2006).

A common critique of C/B Analysis is the challenge of monetizing non-marketed costs and benefits, particularly those associated with the environment. However, great strides have been made in the field of environmental economics to estimate such costs and benefits, including hedonic studies that conclude homes near natural open space have higher sales prices. Another challenge of C/B is to accurately include all the significant groups affected by a project or policy, while also avoiding double-counting of impacts (Frisvold, 2009).

#### *Cost-Effectiveness Analysis*

Cost-effectiveness analysis establishes the “least cost” method of accomplishing a clearly defined goal. For example, if a jurisdiction is faced with the need to increase the available water supply, policymakers might identify a number of methods including both conservation measures and possibly water rights acquisitions, hoping to find the so-called least cost option of augmenting their supply portfolio. Under this example, all the options would have a pre-determined acre-feet of water supply needed, but would vary by how much each supply costs. Cost-effectiveness analysis simply indicates which option has the lowest present value of costs to meet the stated goal. The method and idea of cost-effectiveness may help find the best way to employ limited financial resources to achieve a stated objective. For example, given that a community in aggregate has limited finances to commit to a water conservation

program, which measures yield the greatest water savings or net resource gain for the available funds?

### **III. Examples in Local Water Policy**

There are a number of past, current, and future local policy decisions that require comprehensive economic analysis, considering regional (defined as the Tucson AMA) net benefits defined by the inputs of all key stakeholders. Continuing to ignore the aforementioned economic principles, methods, and instruments in local water policy and allocation discussions will have welfare consequences for the Tucson region. We support holistic appraisal of costs and benefits on a regional scale for the purposes of this study and other local water policy decisions. Water policy that includes the values and needs of all Tucson AMA stakeholders in a common analytic framework is required to achieve regional sustainability goals.

This section attempts to put the abstract economic principles, methods, and instruments into the local context. However, the following examples remain conceptual in nature—designed to promote further analysis and debate, underscore the applicability of economic analysis in water policy decisions, as well as reinforce understanding of the methods introduced in the first half of the paper. The analyses in this section are not finalized policy recommendations, but are illustrative and intended to spark community dialogue regarding management of water as an economic resource.

#### ***Conservation Effluent Pool***

Effluent is increasingly seen throughout the southwestern U.S. as the most reliable component of municipal providers' renewable water supply portfolio. On February 7th, 2000, the City of Tucson and Pima County entered a Supplemental IGA that provided the framework to reallocate up to 10,000 acre-feet of the region's effluent from urban uses to riparian projects (i.e. the Conservation Effluent Pool). The IGA contemplates making effluent available for riparian projects from the Conservation Effluent Pool (CEP) at no cost, but that all costs associated with transportation and reclaimed treatment are paid by what the agreement refers to as the "operator" or "beneficiaries" of the projects. In short, the proposal forces operators or beneficiaries of restoration efforts to pay the "full supply cost" (Figure 1).

#### ***The Economic Value of Local Effluent Supplies***

The City and County IGA fails to consider the future opportunity costs associated with reallocation of effluent from urban to environmental uses. Opportunity cost addresses the fact that by consuming water, one user is depriving another user of the water. If that other use yields a higher net benefit, then there are some opportunity costs experienced by the region due to this so-called misallocation. When evaluating the full economic cost of water used for environmental restoration, it is necessary to consider all other competing alternative uses and estimate value in the best alternative foregone. The City/County Phase I Report

states that the local economic value of water in urban uses is approximately \$160,000 per acre-foot (\$1.6 billion to the local economy in this case). This estimate is derived by dividing regional Gross Domestic Product by acre-feet of water used. This measure at best may be thought of as an average value of water, which is not appropriate for allocation decisions and should not be used to accurately represent opportunity cost (Frisvold, 2009).<sup>3</sup> However, a statement that urban uses are the best alternative foregone is defensible.<sup>4</sup> Briscoe notes that the value of water in environmental uses such as maintenance of wetlands, wildlife refuges, and river flows is typically greater than the value of water in agricultural uses, but lower than values in municipal and industrial sectors (Briscoe, 1996).

As previously stated, there is no opportunity cost if scarcity does not exist. One way to overcome scarcity is to augment basin supplies by importing more water to sufficiently meet all demands. Paying the replacement cost may in fact be a less costly alternative than foregoing the future benefits experienced had the water been allocated to municipal or industrial users. The Central Arizona Water Conservation District (CAWCD) is currently coordinating a supply acquisition program known as ADD Water (Acquisition, Development, and Delivery). Water rights belonging to agriculture and Indian communities along the Colorado River are the most likely supplies available for acquisition. The current acquisition price of these water rights is estimated to be \$5,000 per acre-foot, translating to a CEP replacement cost of approximately \$50,000,000—more when considering annual transportation costs.<sup>5</sup> However, this scenario assumes that sufficient water rights are available for purchase and that CAP will grant access to the Canal to transport supplies to the region. The uncertainties related to these assumptions must be considered before reallocating any volume of locally available effluent. Failure to replace reallocated effluent results in the region suffering considerable opportunity costs in the future due to reduced economic development potential.<sup>6</sup>

#### *Cost-Sharing Among Beneficiaries*

Assuming water rights are available to purchase and CAWCD allows use of the Canal, the question quickly moves from what are the associated costs to how do we equitably distribute costs. The current framework prescribed by the IGA would likely lead to new residents paying the replacement cost associated with the CEP. That is, reallocating 10,000 acre-feet from municipal providers' supply portfolio means that providers will need to purchase additional supplies to accommodate growth and maintain their Designations of Assured

---

<sup>3</sup> See W. Hanemann's *The Economic Conception of Water* (Hanemann, 2006) for thorough discussion of relationship between water and regional economic development.

<sup>4</sup> See Briscoe (1996) *Water as an Economic Good: The Idea and What it Means in Practice* for conceptual discussion regarding value of water in various water sectors.

<sup>5</sup> Note: a discount rate could be applied to future costs associated with annual transportation of new supplies through the CAP Canal (i.e. wheeling charge) in order to understand to present value of all costs associated with that policy alternative. Assuming the wheeling charge is equal to the Excess CAP rate of \$133/AF and increases 3% per year, the net present value of annual transportation costs of 10,000 acre-feet over 20 years is approximately \$17 million.

<sup>6</sup> Note: Reduced economic development potential is a cost the region would experience at some point in the future when it exhausted the available supply portfolio. This future cost must be discounted back to present day for an apples-to-apples comparison.

Water Supply. Acquisitions will likely be financed by bonds and paid back (partially or completely) by future increased water resource impact fees.

Apportioning costs in this manner is contrary to equity principles such as “polluter pays” and “beneficiary pays.” No reasonable argument can be made that future residents caused the historic damage to riparian areas that now require reparation. Also, restoration projects are a regional benefit. Costs sharing for these projects should include all beneficiaries—current and future residents/ratepayers. Yet another way of looking at the issue is to characterize ecological damage caused by historic and current groundwater pumping as an environmental externality. Economic value of ecological damage is typically based on an estimate of remediation costs. In this case, remediation costs are largely paid through reallocation of 10,000 acre-feet of effluent, valued according to water right replacement costs at \$50,000,000 (plus annual wheeling costs).

#### *Possible Solution*

Reallocation of effluent for environmental restoration projects contributes to a sustainable water management plan. Sustainable water management involves balancing environmental, economic, and equity factors for the greatest net benefit of the region. This could be achieved by: 1) remediation of ecological damage by reallocating some volume of regional effluent to restoration projects; 2) replace all or a portion of water reallocated to environmental uses by acquiring new water rights for urban uses/economic development; and 3) distribute costs associated with water right acquisitions among all regional beneficiaries/polluters.

This could be accomplished by a volumetrically assessed (per Ccf) Environmental Fee on potable water sales, where funds collected are committed to servicing debt related to water rights acquisitions necessitated by reallocating effluent to environmental remediation.<sup>7</sup> Tucson Water uses a similar volumetrically assessed fee concept to support its Conservation Program. The Conservation Program annual budget is approximately \$1.5 million. The per Ccf fee is then calculated based on what funds are needed to support the program’s annual budget compared to the projected annual potable water sales. In 2008, Tucson Water projected 50,000,000 Ccfs of potable sales and consequently the fee was set at \$0.03 per Ccf.

The proposed Environmental Fee could be established in a similar manner—matched to the region’s appetite (i.e. willingness to pay) for environmental reparation. If the replacement costs of 10,000 acre feet of effluent are \$50,000,000 (does not include annual wheeling costs), the fee would be set based on the annual debt service of \$50,000,000. For example, if the associated annual debt service was \$5,000,000 and Tucson Water projected 50,000,000 Ccfs in potable sales, then the Environmental Fee would be set at \$0.10 per Ccf. The average residential ratepayer uses between 10 and 12 Ccfs per month, translating to a monthly contribution of \$1 to \$1.20. Moreover, this concept is scalable—structured to allow reallocation of effluent for environmental restoration to whatever volume the region demonstrates a willingness to pay, up to the entire volume of effluent available (if replacement supplies are available).

---

<sup>7</sup> This example is based on an average cost and pricing scheme. Future analyses should be based on the marginal cost of the new supplies to set rates appropriately signaling scarcity (Frisvold, 2009).

The volumetric fee concept internalizes environmental externalities, distributing those costs directly to the end user/beneficiary/polluter and reinforcing cultural messages urging conservation. The fee enables individual ratepayers to legitimize the value ascribed to the community's ecological assets by demonstrating a willingness to pay for reparation, permanently dedicating the water resources needed without sacrificing future economic development potential.

### *Conservation or Acquisition*

As a water utility's demand approaches full utilization of its supply portfolio, it faces the question of whether it is more cost-effective to invest in conservation or acquisition. It is increasingly popular to argue in favor of conservation investments as a more cost-effective alternative to supply acquisition to augment local supply portfolios. The Pacific Institute's report titled *Waste Not, Want Not: The Potential for Urban Water Conservation in California* states:

“Since each water-conservation measure is an alternative to new or expanded physical water supply, measures are considered cost-effective when their unit cost—what we call the ‘cost of conserved water’—is less than the unit cost of the cheapest alternative for new or expanded water supply. We conclude that in California, it is cheaper to conserve water and encourage efficiency than to build new water supplies or even, in some cases, expand existing ones” (Gleick et al, 2003).

The Pacific Institute's report concludes that conservation is more cost-effective than developing new supplies, but it is not clear whether it is more or less cost-effective than acquiring and transferring already developed supplies.<sup>8</sup> The report's analysis tends to focus on the environmental impacts (costs) associated with additional water supplies developed by building new dams, desalinization plants or taking more water “out of the stream.” These environmental externalities weigh heavy in cost analyses, making convincing arguments for conservation investments. However, if a supply is already developed or diverted, then there are no additional environmental costs associated with the transfer (though there may be economic externalities that need to be addressed).

The question we pose is whether conservation is more cost-effective than acquiring and transferring already developed supplies. This analysis is conceptual in nature, intended only to generate discussion. The topic requires rigorous analysis of additional conservation measures and all associated costs, particularly a utility's avoided costs linked to postponed or eliminated capital projects due to conservation measures reducing peak demand. However, the analysis should be helpful to conceptualize a least-cost framework on the subject of conservation versus acquisition in policy discussions.

### *Toilet Replacement Program*

Water utilities often look to toilet replacement or retrofit programs as an effective and cost-effective conservation measure. These programs look to replace older, less efficient toilets

---

<sup>8</sup> We use the phrase “already developed supplies” to refer to water volumes annually diverted and beneficially used.

(generally 3.3 gallons per flush or greater) with newer models known as ultra-low flow (1.6 gallons per flush) or so-called high-efficiency toilets (1.28 gallons per flush). There is a wide range of costs per toilet depending on the model, quantity purchased, whether additional installation costs are considered, or if the utility rebates a portion of the toilet cost versus outright purchase. For the purposes of this simple analysis, assume that the utility is offering to cover 100% of cost to replace 3.3 gallons per flush toilets with 1.28 gallons per flush toilets at a total cost of \$150 per toilet. Assume the water provider's goal is to augment supply by conserving water.

Additional model assumptions include: 1) average house has 2 bathrooms, meaning 2 toilets; 2) average household size of 2.7 people; 3) and each person averages 5 flushes per day.<sup>9</sup> These assumptions mean that a home with two 3.3 gallons per flush toilets, uses approximately 44.5 gallons per day (toilet use only), which translates to 16,260 gallons per year or 0.05 acre-feet per year. If the utility replaced the 3.3 gallons per flush toilets with 1.28 gallons per flush models, the same household uses 17.28 gallons per day—6,307 gallons per year or 0.019 acre-feet per year.

Under these assumptions, the toilet replacement program augments the water supply 0.031 acre-feet per year per household retrofitted with two 1.28 gallons per flush toilets. If each toilet costs \$150, then the utility spends \$300 to save 0.031 acre-feet per year. This means that to save an acre-foot of water per year, the utility must retrofit approximately 32 houses with 1.28 gallons per flush toilets at a cost of \$300 per house or approximately \$9,660. This is comparable to purchasing a perpetual water right at a price of \$9,660 per acre-foot. Given a goal to augment the supply by 1,000 acre-feet per year, the cost to achieve using a toilet retrofit program is approximately \$9,660,000.

### *Water Rights Acquisition*

As noted in the previous section, we estimate a market price of Colorado River water rights at \$5,000 per acre-foot. However, this is solely an acquisition cost. There are likely annual costs associated with wheeling the water through the CAP Canal to the Tucson AMA. For the purpose of this analysis, we assume the wheeling rate is the same as the 2010 price of Excess CAP or \$133 per acre-foot and that it escalates at 3% each year. The net present value of the wheeling charges on 1,000 acre-feet over a 20-year period is approximately \$1.7 million. This adds to the initial acquisition charge for an apples-to-apples comparison. Therefore, the acquisition cost for 1,000 acre-feet is \$5,000,000 (at \$5,000/acre-foot), and the net present value of annual wheeling charges is \$1,700,000. Total cost to acquire 1,000 acre-feet of Colorado River water rights using these assumptions is estimated at \$6,700,000 or \$6,700 per acre-foot.

It is important to note this simple analysis does not include any environmental externalities from transfer of supplies, because we assume this is an existing/developed supply. That is, the 1,000 acre-feet will be used annually in agriculture or transferred to another user and therefore no new environmental impacts arise with the proposed transfer. We also assume that only the consumptive use component of the water right is transferable. Therefore, any return flows historically contributed back to the river system remain “in the river.” For

---

<sup>9</sup> Source: ADWR Tucson AMA Third Management Plan.

example, the farmer may have rights to 1,500 acre-feet per year, but only 1,000 acre-feet per year are consumed in crop production and the other 500 acre-feet per year are returned to the river. To net 1,000 acre-feet per year, the buyer must actually purchase a 1,500 acre-foot per year right. The acquisition scenario described above accounts for this policy limitation on the proposed transfer. This is an example of internalizing environmental externalities in a water rights transfer policy. There may also be economic externalities experienced by the region from which the water right's use transferred (i.e. basin of origin). The hypothetical market transaction described above does not account for these economic externalities or losses potentially experienced by the agricultural region in question.

### *Other Considerations*

The above analysis indicates that it may be more cost-effective to acquire water rights than to invest in a toilet rebate program. While there a number of other costs and benefits, as well as different analytic methods available, this example demonstrates the usefulness of economic analysis to inform water policy decisions. There are a number of other “non-economic” factors to consider in this debate.

Conservation measures are distinguished by whether or not they target a consumptive or non-consumptive use. For example, water used indoors is sent to a water reclamation facility where it is treated and available for reuse. Indoor water use is a “non-consumptive use.” Consequently, water “saved” in a toilet rebate program does not result in a net resource gain or true supply augmentation, because all water used indoors is reusable. This fact may prompt the utility to evaluate conservation measures that target outdoor uses that are in fact consumptive. For example, measures that reduce the amount of outdoor irrigation such as turf-removal programs may be preferred because they reduce consumptive use and achieve net resource gains.

Second, the cost of conservation or efficiency measures goes down over time, while the cost of water rights continues to climb with rising demand across multiple sectors. For example, the cost of high-efficiency toilets and efficient irrigation controls has reduced dramatically in recent years and will likely continue to drop. Assuming water rights will be more expensive over time with rising demand over finite fresh water supplies and conservation measures will become more affordable over the same time horizon, then a utility may want to consider acquiring new supplies now and investing in conservation later.

Third, conservation measures like toilets, cisterns, irrigation controls, etc have a useful life. The useful life of a conservation measure compares to the fact that water rights acquisitions (not lease) are a perpetual entitlement for use of the resource. Similarly, the utility would likely weigh the reliability of the water entitlement, understanding the probability and degree of curtailment in times of shortage due to the right's priority relative to other rights holders.

Finally, the utility may evaluate the difficulty to demonstrate “conserved water” as an acceptable water supply augmentation strategy with applicable regulatory agencies such as ADWR. That is, when water rights are purchased, they are easily added to the provider's supply portfolio in a Modification of Designation of Assured Water Supply. Demonstrating conserved water as a reliable supply may prove more difficult, possibly requiring a multi-year trend with reduced water usage directly resulting from the conservation measure.

#### **IV. Recommendations**

1. Recognize water as an economic resource with value in all its competing uses.
2. Establish policy declaring economic efficiency as the central criterion in water management decisions.
3. Establish policy requiring economic analysis methods, principles, and instruments to establish baseline facts that inform decision-makers of the welfare implications or net benefits of various policy alternatives.
4. Structure community dialogue around the common language or numeraire of money to allow expression and comparison of diverse values in the same analytic framework, and rationalize debate.
5. Evaluate past, current, and future policy decisions such as the Conservation Effluent Pool, Conservation Programs, and Water-Related Ordinances using economic analysis methods and principles.
6. Support holistic appraisal of costs and benefits on a regional scale (defined as the Tucson AMA) for the purposes of this study—including the values and needs of all Tucson AMA stakeholders in a common analytic framework is required to achieve regional welfare gains.

## V. Bibliography

- AWWA. (2006). *Water Conservation Programs—A Planning Manual*. Denver, CO: American Water Works Association.
- AWWA. (2007). *Water Resources Planning*. Denver, CO: American Water Works Association.
- Agthe, D.E., B. Billings, and N. Buras. (2003) *Managing Urban Water Supply*. Boston, MA: Kluwer Academic Publishers.
- Bauer, C. (1997). “Bringing Water Markets Down to Earth: The Political Economy of Water Rights in Chile, 1976-1995”, *World Development*, 25(5), 639-656.
- Bauer, C. (2004) *Siren Song: Chilean Water Law as a Model for International Reform*. Washington D.C.: RFF Press.
- Bauer, C. (2004b) “Results of Chilean Water Markets: Empirical Research Since 1990”, *Water Resources Research*, W09S06, Volume 40.
- Brewer, J, R. Glennon, A. Ker, & G. Libecap. (2007). “Water Markets in the West: Pricing, Trading, and Contractual Forms”, *Arizona Legal Studies*. Discussion Paper No. 07-07.
- Briscoe, J. (1996). “Water as an Economic Good: The Idea and What it Means in Practice. Presented at the World Congress of the International Commission on Irrigation and Drainage, Cairo, Egypt.
- Briscoe, J. (1997). “Managing Water as an Economic Good: Rules for Reformers”, International Committee on Irrigation and Drainage Conference on Water as an Economic Good, Oxford, England.
- Colby, B. (1990). “Transaction Costs and Efficiency in Western Water Allocation. *American Journal Agricultural Economics* 72, 1184-1192.
- Frisvold, G. (2009). Peer review comments and edits attributed to George Frisvold use this citation.
- Gleick, P. et al (2003). *Waste Not, Want Not: The Potential for Urban Water Conservation in California*. Oakland, CA: Pacific Institute.
- Glennon, R. & M. Pearce. (2007). “Transferring Mainstem Colorado River Water Rights: The Arizona Experience”, *Arizona Law Review*. 49 Ariz. L. Rev 235.
- Hanemann, W.H. (2006) “The Economic Conception of Water”, *Water Crisis: Myth or Reality?* London: Eds. P.P. Rogers, M.R. Llamas, L. Martinez-Cortina, Taylor & Francis plc.,
- ICWE. (1992). *The Dublin Statement and Report of the Conference*. International Conference on Water and the Environment: Development Issues for the 21<sup>st</sup> Century. Dublin, Ireland.

Rogers, P., R. Bhatia, & A. Huber. (1998). *Water as a Social and Economic Good: How to Put the Principle into Practice*. Global Water Partnership/Swedish International Development Cooperation Agency, Stockholm, Sweden.

Rogers, P., R. de Silva, & R. Bhatia. (2002). "Water is an Economic Good: How to use Prices to Promote Equity, Efficiency, and Sustainability", *Water Policy*, 4, 1-17.

Rosegrant, M and Binswanger, H. (1994). "Markets in Tradable Water Rights: Potential for Efficiency Gains in Developing Country Water Allocation", *World Development*, 22, 1613-1625.

Saliba, B.C. and D. Bush. (1987). *Water Markets in Theory and Practice: Market Transfers, Water Values and Public Policy*. Boulder, CO: Westview Press.

Savenije, H.G. and P. van der Zaag. (2002). "Water as an Economic Good and Demand Management: Paradigms with Pitfalls." *Water International*, Volume 27, Number 1, 98-104.

Smith, R. (1988). *Trading Water*. Washington D.C.: Council of State Planning and Policy Agencies.

Young, R. (1986) "Why Are There So Few Transactions Among Water Users?", *American Journal Agricultural Economics*, 68, 1143-1151.



# Tucson Regional Water Coalition

*Prosperity - Sustainability - Community*

## TRWC Principles of Sustainable Water Management

### Promote Comprehensive Inclusiveness and Transparency.

Arizona Builders Alliance ○

Alliance of Construction Trades

Arizona Small Business Association

Marana Chamber of Commerce

Metropolitan Pima Alliance

Northern Pima County Chamber of Commerce

Safe and Sensible Water Committee

Southern Arizona Home Builders Association

Southern Arizona Leadership Council

Tucson Association of Realtors

Tucson Metropolitan Chamber of Commerce

Tucson Utility Contractors Association

Tucson Hispanic Chamber of Commerce ○

Water management must be based on a participatory approach, involving a balance of technical expertise and expression of community values with an emphasis on consensus building between those representing current and future users, planners, and policy-makers at all levels within the region.

### Sound Water Resource Management Knows No Jurisdictional Boundaries.

- All water providers, users, and uses in the metropolitan area are connected by reliance on regional groundwater supplies to meet annual demand and provide a buffer against drought. Water planning should be conducted at the basin scale (defined as the Tucson AMA) and should involve all users.
- Support shared use of community infrastructure through cost-effective wheeling agreements for delivery of effluent, surface water, imported groundwater, and/or stored renewable supplies to achieve greater integration, reliability, flexibility and reliance on renewable supplies throughout the region.
- Collectively maximize purchase and underground storage of additional surface water and/or imported groundwater supplies, augmenting local groundwater supplies to further insulate the region from cyclical weather patterns.
  - All local water supplies—groundwater, CAP, other surface water, and effluent—should be cooperatively used for the maximum economic, social, and environmental net benefit of the region expressed in monetized or quantifiable terms.
  - All work products and policies of a local water planning process must be consistent with applicable state laws and policies. In circumstances where local conditions or values conflict with state law and/or policy, the process should seek the appropriate amendments at the state-level.

### **Recognize Water as an Economic Good with Value to all Competing Uses**

- Price signals are an important tool for achieving efficient allocation of water resources. Current retail water rates do not match claims of scarcity and conflict with cultural messages urging conservation.
- Promote policies that facilitate allocation or reallocation of water resources to highest value uses that yield the greatest economic, social, and environmental net benefit for the region expressed in monetized or quantifiable terms.
- Commit to understanding the fundamental relationship between water resources and regional economic development in the form of job retention and creation, and the general prosperity of citizens.

### **Use Economic Analysis to Evaluate Alternatives & Risk**

- Promote non-discriminatory methods, evaluating alternatives objectively and comparing net benefits in monetized or quantifiable terms.
- Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent, focusing policies and finite economic resources on uses/users with the greatest conservation potential.
- Evaluate proven conservation measures as an alternative to supply acquisition, justifying investment decisions on alternatives that yield the greatest economic, social, and environmental net benefit for the region expressed in monetized or quantifiable terms.
- Concerns regarding evolving and/or uncertain conditions should be addressed through iterative risk assessments and decision-making processes, systematically reevaluating risk according to potential financial impact to the region and probability of occurrence.

### **Create Long-Range Financial Plans and Funding Mechanisms**

- A Sustainable Water Resource Management Plan for the region is incomplete without a Budget and Implementation Strategy (Fiscal and Physical). The region must move away from the “plan and pay as we go” approach and develop flexible long-range plans and funding mechanisms to avoid the potential for future crisis management situations.



# Tucson Regional Water Coalition

Prosperity - Sustainability - Community

## **Tucson Regional Water Coalition Review of Phase I Report**

Arizona Builders Alliance

Alliance of Construction  
Trades

Arizona Small Business  
Association

Marana Chamber of  
Commerce

Metropolitan Pima Alliance

Northern Pima County  
Chamber of Commerce

Safe and Sensible Water  
Committee

Southern Arizona Home  
Builders Association

Southern Arizona  
Leadership Council

Tucson Association of  
Realtors

Tucson Metropolitan  
Chamber of Commerce

Tucson Utility  
Contractors Association

Tucson Hispanic  
Chamber of Commerce

The Tucson Regional Water Coalition is committed to staying engaged in this important process and offers the Committee our feedback on your Phase I report. We have organized our comments using the sustainability principles we presented the Committee with during Phase I. We have noted several places in the document where we agree with or are encouraged by the Committee's work to date. Naturally, there are other notable areas where we remain at odds. We offer these comments on the record to again demonstrate our good faith efforts to positively impact this process for the benefit of the region. We will continue to monitor the Committee's meetings and look forward to joining you and all other regional interests in good-natured debate on this important topic.

### **Coalition Principle #1**

***Promote Comprehensive Inclusiveness and Transparency.** Water management must be based on a participatory approach, involving a balance of technical expertise and expression of community values with an emphasis on consensus building between those representing current and future users, planners, and policy-makers at all levels within the region.*

Tucson Regional Water Coalition has been committed to finding meaningful, effective and appropriate ways to engage the process. For the record, the Coalition has submitted written comments on several occasions voicing concerns regarding the limited participation rights granted to impacted parties, including excluded local jurisdictions, Indian tribes, agricultural and mining interests, neighborhood groups, developers, environmentalists, homebuilders, water organizations and agencies, private water utilities, business groups and others who should be meaningfully involved at the foundation of this important effort. The Coalition was encouraged when the Oversight Committee amended the May 2008 Progress Report, demonstrating responsiveness to concerns regarding public participation:

“The Committee recognizes that Phase 2 will be very different than Phase 1, and that based on public input received to date, the Mayor and Council and Board of Supervisors may want to consider restructuring the public process in Phase 2 to include a broader range of interests “at the table”. The Committee will be prepared to report back to the Mayor and Council and Board of Supervisors in October with recommendations on public involvement in Phase 2. The Committee proposes to track Phase 1 progress and to apply the public input and lessons learned described below to make recommendations for how Mayor and Council and the Board of Supervisors might wish to organize the public process for Phase 2.”

However, it was disappointing when the Progress Report dated 12/2/08 states:

On a process level, the Committee is recommending that it continue to provide oversight to the study through Phase II as constituted by the Mayor and Council and the Board of Supervisors in the original scope of work. As in Phase I, the Committee will establish an open and inclusive public process with many access points for all interested stakeholders and the public. In a change from Phase I, however, the Committee recommends a more formal stakeholder review process, to provide review and comment on both the information received by the Committee and recommendations considered by the Committee.

The Coalition recognizes staff and the Committee's efforts to design an open and inclusive process with many access points. However, a well-structured process does not substitute for representation at the table, actively engaged in deliberation, and eligible to vote. Until the process is truly open to affected parties, there is no chance of building consensus or dealing with the larger issues this region faces regarding a sustainable model for growth. Moreover, the Coalition believes that the exclusion of key parties from Phases I and II will diminish the chances that this process will lead to an equitable solution that is embraced by the region.

### **Coalition Principle #2**

***Sound Water Management Knows No Jurisdictional Boundaries.** All water providers, users (public and private), and uses in the metropolitan area are connected by reliance on regional groundwater supplies to meet annual demand and provide a buffer against drought. Water planning should be conducted at the basin scale (defined as the Tucson AMA) and should involve all users.*

According to the Phase I report, groundwater accounts for approximately 64% of the total supply for the Tucson AMA. Although groundwater use is decreasing as municipal providers become more reliant on renewable water supplies as well as decreasing trends in agricultural groundwater use, groundwater remains—and will remain—central to the region's water portfolio. Groundwater availability is an issue that binds all water users in this region. One entity's use of the groundwater supply impacts all other users in the basin. Given the significance of groundwater to all users' supply portfolios it is critical to establish a process that includes all groundwater users in the Tucson AMA. This necessarily includes a Committee with representatives from the agricultural, industrial, and Indian communities. These 3 groups account for more than half the region's groundwater use – and yet, they have not yet been invited to join the Committee. Additionally, all other local jurisdictions and private water utilities utilize groundwater in varying degrees, but they too have not been asked to join the Committee.

### **Coalition Principle #3**

***Sound Water Management Knows No Jurisdictional Boundaries.** Support shared use of community infrastructure through cost-effective wheeling agreements for delivery of effluent, surface water, imported groundwater, and/or stored renewable supplies to achieve greater integration, reliability, flexibility, and reliance on renewable supplies throughout the region.*

The Coalition commends the Committee for addressing this important discussion throughout the document. Specifically, Volume 2: Section 3 (Committee Themes, Values, and Concerns) contains several encouraging statements, where the Committee has highlighted this topic for

policy discussions in Phase II. However, it is again important to note that the Committee's deliberations would be more complete if parties likely to enter into, or support, exchange and/or wheeling agreements [and/or expansion of regional delivery systems] were part of this policy debate. These parties could include all users of groundwater in the Tucson AMA that do not have cost-effective alternatives available to reduce their groundwater utilization, as well as environmental groups that would support reduced groundwater pumping throughout the Tucson AMA. As noted in the document, reducing groundwater dependency is a regional benefit. There are both infrastructure costs and water resource costs associated with the goal to reduce groundwater pumping. Given the regional benefits of reduced groundwater pumping, it is easy to justify the sharing of costs equitably among all beneficiaries.

The Coalition commends the Committee's recognition that the City's interim policy to provide water service only to its obligated service area has environmental, social, and environmental implications. The interim policy is clearly related to the issue of reducing groundwater dependency in our region. The Coalition supports policies that recognize the City's potable and reclaimed recharge and recovery infrastructure as well as extensive delivery systems are an important community asset. Policies that create open and creative use of the City's infrastructure will allow for equitable, cost-effective solutions to further reduce groundwater dependency in our region.

#### **Coalition Principle #4**

*Sound Water Management Knows No Jurisdictional Boundaries. Collectively maximize purchase and underground storage of additional surface water and/or impaired groundwater supplies, augmenting local groundwater supplies to further insulate the region from cyclical weather patterns.*

The Coalition is encouraged that the Phase I report identified supply acquisition as an important topic. The Coalition agrees that our region must begin to think about long-term supply needs to support anticipated growth. These new supplies will be expensive and there will likely be considerable competition from local jurisdictions in the Phoenix AMA. As the report notes, the CAWCD's ADD Water Process is the proper venue to engage at this time. This process should help to reduce acquisition costs by establishing a fair process to pay and share new water supplies. The Coalition believes Tucson AMA water users are under-informed and ill-prepared to write sizable checks to secure water entitlements at the conclusion of the ADD Water Process, which will conclude in the next 1-2 years. The Coalition does not feel there has been good coordination between Tucson AMA water entities that might have engaged the ADD Water Process collectively and strategically, and encourages the Committee to make this a priority in Phase II discussions. Other water interests around the state continue to view the Tucson area players as not having their act together. Time is of the essence and the Committee could play an important role in bringing all regional players to the table to strategically engage ADD Water for the betterment of the region.

Still, water rights acquisition is only part of the solution. The full CAP allocations of Tucson AMA Subcontractors should be ordered annually. While the Coalition is sensitive to Tucson Water's financial constraints and understands the solution to reduce 2009-2011 CAP orders,

we believe this raises a larger question about linking the region's long-term water management goals to the fiscal health of a single utility. Maximizing annual purchase and storage of CAP while it is abundant is an essential way to further insulate the region from lengthy droughts and potential shortages. The Coalition continues to advocate that our community study the feasibility of a regional authority with the appropriate financial tools to ensure the constant practice of good water management, and to ensure both costs and benefits are equitably shared by beneficiaries throughout the region.

### **Coalition Principles #5 & #8**

***Sound Water Management Knows No Jurisdictional Boundaries.** All local water supplies—groundwater, CAP, other surface water, and effluent—should be cooperatively used for the maximum economic, social, and environmental net benefit of the region expressed in monetized or quantifiable terms.*

***Recognize Water as an Economic Good with Value to all Competing Uses.** Promote policies that facilitate allocation or reallocation of water resources to highest value uses that yield the greatest economic, social, and environmental net benefit for the region expressed in monetized or quantifiable terms.*

The Coalition believes these two principles are best understood in the context of the Conservation Effluent Pool. The Committee's 'Theme' section does recognize the need to utilize cost analysis methods as a foundation to sustainable water management. However, the Coalition is disappointed that this type of analysis was not applied initially by the City and County or retroactively in the Committee's deliberations regarding the Conservation Effluent Pool. We recommend that finalization of the Conservation Effluent Pool be postponed until after proper cost analysis is employed and the Committee as well as the community is able to debate the merits of setting aside a pool of water for environmental restoration. We understand that the Conservation Effluent Pool is not part of the formal scope of work given to the Committee, but feel that the Committee should discuss this important policy decision in Phase II. We recommend that we postpone finalizing this concept until cost analytics are employed to assess the wisdom of this decision.

It is often stated but bears repeating that effluent is the only drought-resistant, expanding water supply available to the region. The Coalition believes that effluent will soon become the most vital component of the region's renewable water supply portfolio. Given the critical importance of this water supply, the Coalition asks that the study attempt to understand the economic value of available effluent to all competing uses in the region before allocating any portion. It is premature to finalize the Conservation Effluent Pool before understanding the opportunity costs and ecological benefits of committing 10,000 acre-feet or more to environmental restoration projects. There has been no discussion of whether \$50 Million (or \$100 Million, or even \$220 Million, depending upon one's valuation of water rights) worth of the community's assets should be spent on this activity: during the City/County Study it was estimated that the "next bucket" of water may cost as much as \$5,000 to \$10,000 per acre foot. Once these costs and benefits are quantified and/or monetized, the Committee and community can compare the value of the existing and proposed restoration projects to understand if the costs match the benefits.

The opportunity costs of committing 10,000 acre-feet to environmental restoration projects are even greater. The City/County Study includes the finding that water committed to urban uses generates \$160,000 per acre foot in economic development, meaning the approximate opportunity cost of the CEP is \$1.6 billion to the local economy. The Coalition believes an investment decision of this magnitude should receive much more attention from the Committee, not to mention input from the community.

### **Coalition Principle #6**

***Sound Water Management Knows No Jurisdictional Boundaries.** All work products and policies of a local water planning process must be consistent with applicable state laws and policies. In circumstances where local conditions or values conflict with state law and/or policy, the process should seek the appropriate amendments at the state-level.*

The Coalition applauds the Committee's restraint regarding issues fully governed by state law. The Coalition cautions the Committee in three important areas: 1) large-scale rainwater harvesting projects aimed at augmenting local supplies using dams and/or recharge projects; 2) comparing investments in conservation versus supply acquisition given the Assured Water Supply rules which make including "conserved" water in portfolios much more difficult than simply acquiring new water entitlements; and 3) local attempts to restrict or regulate groundwater pumping in certain areas of the basin.

### **Coalition Principle #7**

***Recognize Water as an Economic Good with Value to all Competing Uses.** Price signals are an important tool for achieving efficient allocation of water resources. Current retail rates do not match claims of scarcity and conflict with cultural messages urging conservation.*

The Coalition is encouraged to see the Committee's support of this principle in the Themes section of the Phase I report. The report also notes that the average water bill is just over \$23 per month. This is not sending the proper price signal to the utility's customers. The public cannot be expected to treat water supply as the critical issue it is, when the monthly water bill is less than three tickets to the movies. Retail water rates should be adjusted to ensure the long-term fiscal health of Tucson Water and Pima County Wastewater. The Coalition recommends that Tucson Water and Pima County Wastewater staff and Citizen Advisory groups perform comprehensive reevaluation of existing rate structures.

### **Coalition Principle #9**

***Recognize Water as an Economic Good with Value to all Competing Uses.** Commit to understanding the fundamental relationship between water resources and regional economic development in the form of job retention and creation, and the general prosperity of citizens.*

The Coalition agrees with the Committee's explicit statement regarding the importance of water to support our local economy. As noted in the report, Tucson Water's 136,000 acre-feet of water service helps support a local economy with a \$22 billion dollar gross domestic

product, representing an economic value of approximately \$160,000 per acre-foot. We have said before that the Committee's figure should be considered when understanding the opportunity costs of allocating water to non-urban uses.

### **Coalition Principle #10**

*Use Economic Analysis to Evaluate Alternatives & Risk. Promote non-discriminatory methods, evaluating alternative objectively and comparing net benefits in monetized or quantifiable terms.*

The Coalition recognizes that Phase I was not designed to analyze alternatives or engage in scenario planning. We are encouraged that these concepts were highlighted in the Committee's Themes section, and urge the use of methods such as triple bottom-line analysis will be employed in Phase II. Specifically, we believe cost analysis methods that monetize or quantify costs provide an invaluable service to water management debates, both informing policy discussion and enhancing the transparency of public processes.

### **Coalition Principles #11 & 12**

*Use Economic Analysis to Evaluate Alternatives & Risk. Promote community-wide conservation goals and standards that maximize acre-feet saved per community dollar spent, focusing policies and finite economic resources on uses/users with the greatest conservation potential.*

*Use Economic Analysis to Evaluate Alternatives & Risk. Evaluate proven conservation measures as an alternative to supply acquisition, justifying investment decisions on alternatives that yield the greatest economic, social, and environmental net benefit for the region expressed in monetized or quantifiable terms.*

The Coalition supports the Committee's recognition in the Themes section that "conserved water" should be compared to supply acquisition, understanding the limitations given the Assured Water Supply rules accounting for conserved water in a provider's portfolio. As noted in the report, "water conservation and new water resources are seen as two sides of the same coin." We understand that water conservation standards are to be addressed in Phase II. Tucson Water's Community Conservation Task Force report provides a good framework for rigorous cost analysis, including cost-benefit ratios for both the utility and the impacted customer classes. The Coalition urges the Committee to build on the work of the Community Conservation Task Force. It is important that the community continue to fund conservation investments that offer the most water saved per community dollar spent, and move away from creating "feel good" policies that make good newspaper headlines but have poor cost-benefit ratios.

### **Coalition Principle #13**

*Use Economic Analysis to Evaluate Alternatives & Risk. Concerns regarding evolving and/or uncertain conditions should be addressed through iterative risk assessments and*

*decision-making processes, systematically reevaluating risk according to potential impact to the region and probability of occurrence.*

The Coalition is encouraged to find that the concept of quantitative risk assessments added to conversations regarding the potential impacts of climate change. The Coalition is concerned that doomsday projections regarding the availability of CAP will lead to costly and irrational policy decisions. The Coalition is concerned that the use of fear to support policy-making or investment decisions could be counter-productive. From our view, it is important to first quantify the financial and/or economic impact of potential worst-case scenarios, then understand the probability that worst-case scenarios might occur. Doomsday scenarios with high fiscal and economic impacts, but extremely low probability of occurrence should be addressed proportionately. Climactic conditions and Colorado River water availability have and will continue to unfold and evolve over time, and jurisdictions throughout the state should continuously monitor climate and water availability factors, and be ready to respond accordingly, in accordance with plans that they have in place to address such changes.

#### **Coalition Principle #14**

***Create Long-Range Financial Plans and Funding Mechanisms.** A Sustainable Water Resource Management Plan for the region is incomplete without a Budget and Implementation Strategy (Fiscal and Physical). The region must move away from the ‘plan and pay as we go’ approach and develop flexible long-range plans and funding mechanisms to avoid the potential for future crisis management situations.*

The Coalition supports the Committee’s acknowledgement in the Themes section that pertains to the importance of sound financial planning in defining a sustainable water resource management plan. The Coalition recommends that the Committee’s efforts in Phase II include research on governance models and financial planning of various regional water authorities in the Southwestern U.S. The Southern Nevada Water Authority, the Albuquerque Bernalillo County Water Utility Authority, and the Metropolitan Water District of Southern California have all engaged the issues that we face, and they all have experiences and lessons that can help the Tucson region address our own challenges.