WHO SAID WHAT?

A Report on Public Comments Submitted to the Joint Water and Wastewater Infrastructure, Supply & Planning Study,
A City of Tucson and Pima County Cooperative Project

Executive Summary

Submitted by

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OVERVIEW

At the February 9, 2010 Mayor and Council public hearing on the Phase II draft, I committed to preparing a report on the public comment submitted during Phases I and II of the joint water/wastewater study. My report is titled, **"WHO SAID WHAT?: A Report on Public Comments Submitted to the Joint Water and Wastewater Infrastructure, Supply & Planning Study, A City of Tucson and Pima County Cooperative Project."**

Between April 9, 2008 and February 17, 2010, the City of Tucson and Pima County engaged in a joint "Water and Wastewater Infrastructure, Supply & Planning Study" (Joint Study). Between April 2008 and February 2010, one hundred and twenty-four people submitted three hundred and eleven comments to the Joint Study, making the effort to submit thoughtful comments on an issue central to the well-being of the community. The Joint Study created the opportunity for a vibrant and often passionate dialogue on water and wastewater. The report **WHO SAID WHAT?** documents a rare community dialogue and functions as a companion document to the Phase I and II reports. More importantly, the report gives credit where credit is due: to one hundred and twenty-four people who went to the trouble to voice their opinions.

The report includes seven chapters. Chapter One provides a conceptual overview of the Joint Study and a statistical profile of the "who" of the public comments.

Chapters Two through Seven focus on the "what" of the public comments (see chapter titles below). The chapters are organized by stakeholder categories and document all public comments by organizational affiliation, then the people speaking on behalf of the organization, and then on the timing of the comments. All comments are excerpted from the original, but are also quoted rather than interpreted. Comments are documented, either by written documents submitted (emails, letters, and reports) or from written transcripts of oral comments at meetings. Comments that could not be documented are not included in this report.

Chapter Two	Local Water Utilities and Jurisdictions
Chapter Three	Business Stakeholders
Chapter Four	Environmental Stakeholders
Chapter Five	Neighborhood Stakeholders
Chapter Six	Individual Stakeholders
Chapter Seven	Stakeholders with a Broader Geographic Perspective

This Executive Summary serves three purposes. First, it provides a brief statistical overview of who made comments and when they made them. Second, it brings together in one document all of the "summaries of major themes" from Chapters Two to Seven. Third, it presents my analysis of three major issues that recur throughout the public comments: (1) how to evaluate growth; (2) competing paradigms for water resource management; and (3) "having a seat at the table" in discussions on a sustainable water future. Where the final report focuses on what people actually said, the executive summary represents **my analyses** of what people said.

SOME STATISTICS ON WHO SAID WHAT

As the report title says, both the "**who**" and the "**what**" of the three hundred and eleven public comments received during Phases I and II are important. All but six of these one hundred and twenty-four people identified themselves by name, of which eighty-nine people also identified an affiliation with one of fifty-four named organizations. The **"who"** in the report, therefore includes both personal identifications and organizational affiliations. People identified fifty-four organizations to which they were affiliated. I sported these organizations into one of five "stakeholder categories": local water utilities and jurisdictions, business, environmental, neighborhood, and those with a broader geographic perspective.

I combined the twenty-nine individuals who identified themselves but claimed no organizational affiliation into a sixth category of Individual Stakeholder, and included the six individuals whose names could not be identified in this category as well.

Exhibit 1 below shows there was a good cross section of stakeholder involvement with the public input process.

Exhibit 1 Number of Organizations and People, by Stakeholder Category

Stakeholder Category	# of Organizations	# of People
Local Water Utilities and Jurisdictions	9	14
Business	18	26
Environmental	11	19
Neighborhood	6	10
Individual	0	35
Broader Geographic Perspectives	10	20
Total	54	124

People submitted comments in one of three ways: oral comments at meetings, written comments by letter or e-mail, and presentations at meetings. Exhibit 2 below shows that people submitted one hundred and sixty-four oral comments, one hundred and twenty-five written comments and twenty-two presentations.

Exhibit 2 Number of Comments by Type of Comment

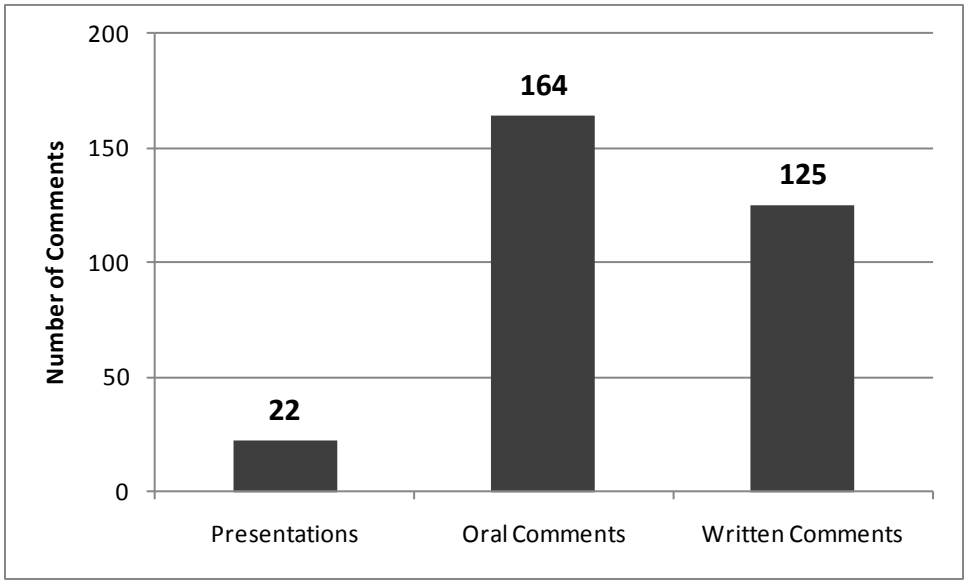


Exhibit 3 shows how many comments people in each stakeholder category submitted. Individual stakeholders submitted highest number of comments at ninety-eight. People in the Business, Environmental, and Neighborhood stakeholder categories submitted equal numbers of comments, between fifty-one and fifty-three. People in the Broader Geographical Perspective category submitted thirty-four comments, but fourteen were presentations at committee meetings, which were detailed and formal. Local Entities (the water utilities and jurisdictions) submitted twenty-four comments.

Exhibit 3 Number of Comments Made by Stakeholder Category

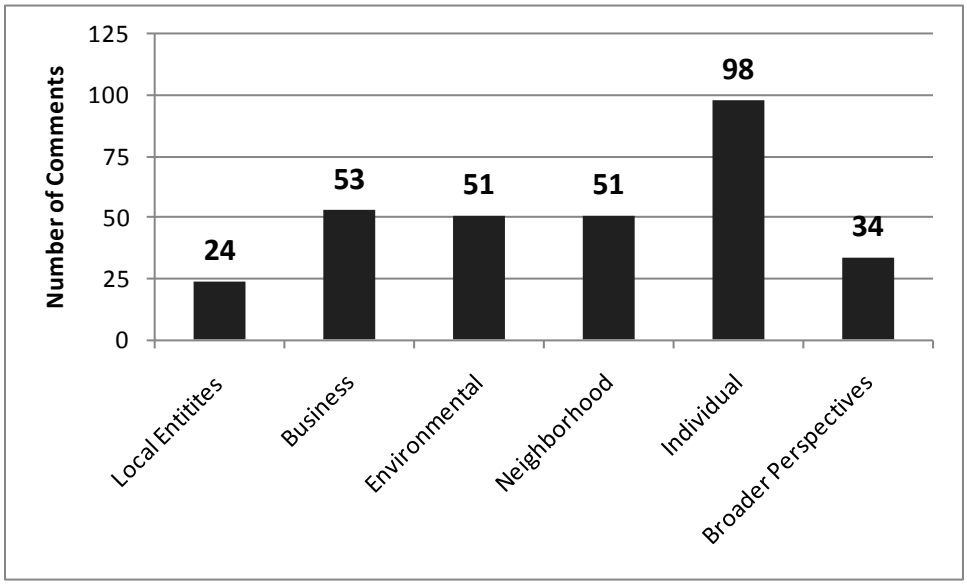
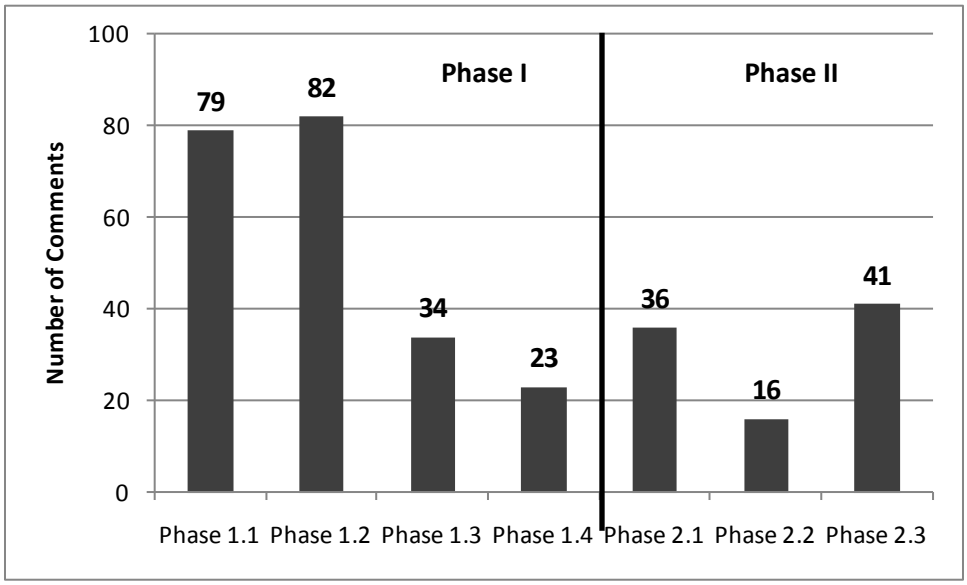


Exhibit 4 below shows that people made more comments during Phase I than Phase II. People submitted seventy-nine comments during Phase 1.1, the "getting started" period, during which the local entities and business interests sought to recast the scope of work and reconstitute the participants ("who had a seat at the table") for this study.

People became active in Phase 2.3, the "public hearings held by Mayor and Council and the Board of Supervisors, advocating for and against approval of the Phase II Final Report.

Exhibit 4 Number of Comments Made, by Phase



SUMMARIES OF MAJOR THEMES

Comments covered a wide range of topics (see Exhibit 5 below)**.** Several people commented on water supply issues; about matching supplies to demand; water shortages; and organizing the acquisition of new water supplies. Several other people spoke to the environment's need for water and the positive values derived from healthy riparian and aquatic systems.

Many people criticized the Joint Study for providing "seats at the table" only for the City of Tucson and Pima County, demanding that the process be opened up from the start. Other people accepted the city/county focus in Phases I and II, with the expectation that a regional dialogue would follow upon completion of Phase II. For these people, transparency and openness were critical; many expressed a real distrust of government or of others participating in the public outreach.

Business stakeholders stressed an economic foundation for water and wastewater resource management. Their economic concerns led many business stakeholders to oppose the Phase II report.

Many environmental, neighborhood, and individual stakeholders sought to expend the terms of discussion about water and wastewater resource management. In addition to prioritizing the environment's need for water, these stakeholders stressed uncertainties (climate-related, follow the precautionary principle), and choosing searching for alternatives to new, probably imported, water supplies such as rainwater harvesting, stormwater management, and conservation.

A few stakeholders stressed water quality issues. One stakeholder focused exclusively on the "energy/water nexus."

LOCAL WATER UTILITIES AND JURISDICTIONS

Thirteen representatives of local water utilities and jurisdictions submitted twenty-two comments, which focused on four major themes: A. Call for a Regional Dialogue; B. Focus on Water Supply Issues; C. Town of Sahuarita Concerns; and, D. A Look to the Future of Water Conservation

A. Call for A Regional Dialogue

The water utilities and local jurisdictions objected to Phases I and II because only the city and county were in the dialogue. The water utilities and local jurisdictions maintained that a conversation about water that included only the city and county was inherently inappropriate and potentially harmful.

In two written comments, SAWUA argued that "members of SAWUA … should be consulted before any decisions are made" and "all of the water utilities in Pima County should have first been brought together to develop a basis from which to proceed." SAWUA wrote requesting "a seat at the table in any future regional water discussion"

From the Town of Marana, Mike Reuwsaat argued that Phases I and II "cannot be completed without the involvement of the other affected communities," that waiting until after the first two phases to involve others will leave "little room for participation, comment or innovation." Brad DeSpain

Exhibit 5 Summary of Major Themes by Stakeholder Category

Local Water Utilities/ Jurisdictions	Business Stakeholders	Environmental Stakeholders	Neighbor Stakeholders	Individual Stakeholders	Wider Geographic Perspectives
Call for a Regional Dialogue	Call for a Regional Dialogue	Meeting the Environment's Needs For Water	Beware of Dangers To The Study	Live Within Our Means	Water Supply And User Profiles
Focus on Water Supply Issues	Plan for Regional Structures	Living Within Limits of Finite Resources	Keep The Process Open And Inclusive	Emphasize Rainwater Harvesting, Stormwater Capture, Conservation	Is There Enough Water in the Tucson AMA
Specific Concerns of the Town of Sahuarita	Adopt a Paradigm Based On Economic Rationality	Focus on Conservation Before Securing New Water Supplies	Practice The Precautionary Principle	Address Tucson AMA Regional Perspectives	Acquiring New Water Supplies
A Look at the Future Of Conservation	Recognize Economic Or Scarcity Value Of Water	Avoid High Technology Solutions	Priortize Water Quality	Protect Water Quality	Acknowledge Climate-Related Uncertainties
	Delay The Phase 2 Report	Prioritize Local Water Resources Over Imported Water		Recommendations on Community Outreach	New Paradigms for Water Resource Management
		Energy, Carbon Footprints, And Climate Change		Distrust Of Government	
		Dangers of Privatizing Water And Wastewater Systems		Addreess the Energy/Water Nexus	

wrote requesting, “the Committee panel representatives be reviewed to ensure equitable representation by all water and water reclamation facilities in the region.” Mayor Skelton from Sahuarita wrote, “One Council Member was adamant that outlying jurisdictions be brought to the table in Phase 2 and not wait until Phase 3.” Mayor Skelton complained that only the city and county were setting “policy and values” and that there was a lack of clarity in definition of critical terms like “region” or “metropolitan area.”

Dave Andrews from the Town of Oro Valley objected because “when this study commenced jurisdictions were invited to attend any of the public meetings, but were in fact not invited to participate on the committee itself, in any form,” and that a request from SAWUA “to have a representative and participate on the committee” was rejected.

Val Little from Water CASA cautioned, “a strictly city-county venture such as this is feasible only in theory,” arguing instead that the city and county should expand the committee membership.

Both Marana and Sahuarita spoke to their aspirations for degrees of self-sufficiency and autonomy.

B. Focus on Water Supply Issues

Some representatives objected to the scope on substantive grounds. SAWUA stated this most succinctly (1) “A detailed analysis of all infrastructure of each utility is unnecessary”; and (2) “the region’s water utilities know precisely what water resources they have access to. … These facts are not unknown to the region’s water utilities and professional water managers.”

The water utilities preferred to focus on regional water discussion on water supply and management, deemphasizing other topics in the approved scope. SAWUA described its preferred focus, “when any of our members’ customers turn on the tap, there is water.” SAWUA described its proposal for a “voluntary nonprofit organization ... to find and secure additional water resources for the region and serve as a wholesale water provider to its members.” SAWUA spoke of a need for “the governing bodies (to) begin the conversation about how to obtain additional supplies from where, and at what cost.” SAWUA noted, “Each and every one of us has developed long-range projections of water demands and has developed plans to meet those demands.”

Mr. DeSpain emphasized the importance of focusing on water supply, referring to ”providing safe water services to residents” and “ensuring adequate renewable resources for the region.” Noting efforts such as the ADD Water Program, which are “beginning to evaluate water supply and delivery options within Arizona,” Mr. DeSpain argued it is “in the best interests of the region to identify its concerns and have a unified voice.”

In his comments on cooperation among northwest side jurisdictions, Mr. Andrews spoke of their “commitment and cooperation, especially in the area of water management, conservation and the development of renewable water resources, such as reclaimed water and CAP water.”

Water utilities stressed their expertise in water resource management, which they considered central to a regional discussion. SAWUA wrote, ”When it comes to water the members of SAWUA are the experts who should be consulted with before any decisions are made.”SAWUA notes the water utilities “know precisely” what their water resources are; have “developed plans to meet those demands; and that ADWR “has aggregated this information across the region.”

C. Town of Sahuarita Concerns

Mayor Skelton noted that, while the town operates a wastewater treatment facility covering about 50% of its population, water service is provided by “six plus independent water companies of varying size.” Perhaps because of these facts, Sahuarita raised issues not raised by Marana or Oro Valley.

In a letter, Mayor Skelton raised three issues: (1) the "heavy use of groundwater by the mining industry; (2) "how water is priced"; and (3) "While it is imperative for Southern Arizona to have a regional water strategy, water issues are also statewide issues, with local implications."

In his written comments, Jim Stahle endorsed a regional dialogue following upon completion of Phases I and II. Mr. Stahle identified issues that a regional dialogue should address, such as (1) "both water resource and land use planning"; (2) "regional solutions to stormwater"; (3) "the availability of renewable water supplies"; (4) ensuring "recharge occurs within reasonable proximity to groundwater pumping"; and (5) ensuring "groundwater ecosystems are protected."

Mr. Stahle also raised cautions about a regional dialogue as well, such as (1) "the use of in-lieu mitigation (must not cause) destruction of riparian habitat … in exchange for funding restoration elsewhere"; (2) the town "strongly disagrees" with asking PAG to serve as the "regional entity"; (3) efforts to "secure additional water supplies primarily reflect (the interests of) water utilities," and not necessarily those of "various regional jurisdictions"; and, (4) a regional dialogue "should not be construed as a mechanism to establish regional utilities for water and wastewater."

D. A Look at the Future of Water Conservation

Val Little works for an association largely comprised of water utilities, but with an exclusive focus on conservation. At the request of staff and the committee, Ms. Little presented a white paper on conservation during Phase II, describing a range of conservation tools, providing some examples of conservation efforts elsewhere in the world, and looking forward to how conservation regionally might, or should, evolve.

Ms. Little sketched an expansive definition of conservation and a myriad of tools that many entities can use and already are using, including Tucson Water. Ms. Little posed significant challenges to water utilities and jurisdictions locally, including her own membership, stating, "regionally, we need to make a conscious shift from a growth-based economy to one that is more sustainable; we have entered the uncharted waters of limits and drastically changing priorities."

Ms. Little posed a challenge to water utilities of either changing their mindset and expertise, or changing the hierarchy of expertise within water utilities. Ms. Little wrote, "One reason the efficiency programs are difficult for traditional water agencies to fully embrace is that they shift the burden from engineering logistics to social ones.

Ms. Little posed challenged water utilities to broaden their sense of what is possible. For example, Ms. Little pointed to the example of Queensland, Australia, which lowered their use to 33.8 gallons per capita per day and Melbourne, which set a goal of 41 gallons per capita per day. Ms. Little made some predictions of water use policies of the future, such as not allowing potable water use for irrigation or toilet flushing; promulgation of new home standards that reduce use to 35 gallons per capita per day; and, enactment of ordinances requiring retrofitting of used homes to new home standards upon resale.

BUSINESS STAKEHOLDERS

Business interests submitted comments touching on four major themes: (A) call for a regional dialogue; (B) plan for regional structures; (C) articulation of a paradigm for water resource management derived from economic rationality; and (D) delay the Phase II report until economic analyses are completed. This section summarizes business interest comments in these three categories. Note, however, that their economics-based paradigm of water resource management is logically their central organizing concept.

A. Call for A Regional Dialogue

The Tucson Regional Water Coalition included "a comprehensive, inclusive, transparent and regional process" as one of its sustainable water resource management principles in its October 29, 2010 sustainability comments. Several business interests expressed this principle as strong opposition to the city/county focus of Phases I and II. TRWC addressed this issue in six of its nine written comments. SAHBA, SALC and TMCC voiced their opposition during Phase 1.1, Getting Started and Phase 2.3, Public Hearings. Metropolitan Pima Alliance and Tucson Association of Realtors expressed their opposition during Phase 1.1, Getting Started. The business interests were not concerned with improving public involvement with the study; they wanted to restructure the entire process.

In their letter of February 7, 2008, TRWC spoke of the "region's shared quality of life," "working together," and a "shared imperative" and voiced their concern that "without the relevant input from others, from the beginning, this study cannot meet the needs of our community … Meaningful and substantive involvement (of others) … should be actively engaged from the inception of the process …"

In its letter of February 19, 2008, TRWC states, "we believe it is premature for the study to go forward without significantly more input into the scope of the study."

Several commentators identified the stakeholders that needed to be "at the table." Alex Jacome from SAHBA defined "regional stakeholders to include but not be limited to: local jurisdictions and tribal governments, private water companies, environmental groups, state agencies, business and economic development interests, neighborhood and citizen groups, industry experts, developers, homebuilders, as well as agricultural and industrial water users."

B. Plan for Regional Structures

TRWC offered four comments that relate to the structuring of regional relations between water utilities and other stakeholders.

1) TRWC "continues to advocate for the community to 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."

2) TRWC recommends "research on governance models and financial planning of various regional water authorities in the Southwestern U.S., including the Southern Nevada Water Authority,

Albuquerque Bernalillo County Water Utility Authority, and the Metropolitan Water District of Southern California."

3) TRWC writes, "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."

4) TRWC calls for "long-range financial plans and funding mechanisms," arguing "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."

C. Adopt A Paradigm Of Water Resource Management Based On Economic Rationality

During Phase 1.3, Sustainability Discussions and Phase 2.1, Technical Presentations, the Tucson Regional Water Coalition articulated a paradigm of water resource management derived from principles of economic rationality. In oral comments on October 9, 2008, Michael McNulty, an attorney with Lewis and Roca speaking for the coalition. Mr. McNulty characterized this paradigm as "integrated water resource management," which he defined as a "fairly accepted set of scientific, rational ways of doing this, that's been adopted by the World Bank and the United Nations and … the American Waterworks Association."

TRWC presented a paradigm based on economics as a goal and economic rationality as the basis of managing scarce resources. TRWC summarized its principles of economic rationality in water resource management as follows:

> "The Coalition's water resource sustainability principles are not a menu of options to be applied individually or to serve as criteria in case-specific evaluations. Rather the Coalition offers these principles in their entirety to guide, and in support of, a scenario planning process that seeks to understand costs and benefits on a regional scale"

TRWC's goal for water sustainability is to support "economic vitality, population growth (current and future population) and quality of life." Achieving a sustainable water supply is an interrelated function of (a) identifying and maximizing entitlements to and physical availability of water supplies and (b) a regionally coordinated effort among all water stakeholders in implementing best management practices for the efficient use, conservation and management of water supplies.

The paradigm of economic rationality rests on (1) "the allocation and reallocation of water sources to the highest value uses"; (2) "an understanding of the fundamental relationship between water resources and regional economic development"; and (3) recognizing "water as an economic good with value to all competing uses."

D. Recognize the Economic or Scarcity Value of Water

The white paper "Economic Needs for Water," posited as a starting point for water resource management the acknowledgement of the "relative scarcity" of fresh water, meaning that "supplies are (or will be) insufficient to meet all competing uses." Scarcity is "particularly relevant to rapidly growing arid or semi-arid regions with increasing demands across multiple water use sectors – municipal, industrial, agricultural, and environmental." Faced with scarcity, we should utilize "economically-minded water policies to achieve efficient use and allocation of available supplies," allocations that maximize "the general welfare of net benefits enjoyed in utilization of a community's water resources," which is "achieved by allocating water to highly valued uses and away from uses that hold less value to the community."

The "economic or scarcity value of water" relates to a central concept for the business interests: opportunity costs. Opportunity costs" only occur when water is scarce, in those situations where the use of water by one user deprives another user of his/her water use. In these circumstances of competing uses, if the user deprived of water places a higher value on his/her water use, there is an "opportunity cost" imposed by the prevailing user, equal to "the value of water in the best alternative use foregone."

TRWC's white paper identified four methodologies for allocating scarce resources to their most productive and efficient uses: markets, retail pricing, and two "economic appraisal tools" – cost-benefit analysis and cost-effectiveness analysis.

E. Use Economic Rationality to Delay the Phase 2 Report

On January 12, 2010, the Board of Supervisors approved a resolution that supports the Phase II Report and directs staff to develop a detailed implementation plan for the Board's approval. Mayor/Council approved its resolution at a meeting of February 17, 2010. Over this two and one-half month period, the business stakeholders voiced strong opposition to the Phase II Report, urging Mayor/Council and Board to delay approving the report.

For the February 9, 2010 public hearing, nineteen business stakeholders submitted written comments to Mayor and Council, urging them to delay formal adoption of the Phase II Report. Exhibit 6 below identifies their five basic objections, four of which derive from the economic rationality paradigm.

Exhibit 6 Summary of Themes in Written Comments by Business Interests

Themes	Number of Comments Made
Draft report does not reflect water as an economic value; relationship of water to regional economic development; importance of job creation; near term economic and fiscal conditions; long-term economic development and security	13
Draft report does not provide adequate cost-benefit analysis; need to make prudent financial decisions; must inform the public of costs of reallocating water	10
Delay the Conservation Effluent Pool	9
Extend the Tucson Water Obligated Service Area	3
Need to have a true regional process; all stakeholders must be at the table	10
Total Comments	45

ENVIRONMENTAL STAKEHOLDERS

The environmental stakeholders advocated for a new paradigm for water resource management. Representatives of Sustainable Tucson labeled their paradigm "holistic and adaptive water resource management." At a minimum, environmental advocates viewed their paradigm as a complement to experts with more traditional engineering and economic backgrounds."

For the environmental advocates, the new holistic and adaptive water management paradigm consists of seven principles: (A) Meeting the environment's needs for water; (B) Living within limits imposed by finite resources; (C) Focus on conservation and demand management before securing new water supplies; (D) Avoid high tech solutions; (E) Prioritize local water resources over imported water; (F) Energy, carbon footprints, and climate change; and (G) Dangers in privatizing water and wastewater systems.

A. Meeting the Environment's Needs for Water

Environmental advocates argued that respect for the environment and its need for water is the primary tenet of holistic and adaptive water resource management. For these advocates, the environmental is both a user as well as a supplier of water.

During the sustainability discussions, several environmental advocates addressed respect for the environment. Kendall Kroesen from the Tucson Audubon Society wrote about "two big problems with our current water delivery system," the first of which is the assumption "that humans are the only users of water." Mr. Kroesen wrote that "We have a responsibility to conserve water for species that need

water; to conserve riparian areas for their aesthetic value and other inherent values," and that "any Comprehensive Water Plan must first protect remaining high water tables that support riparian areas and strive to restore those that have been lost." Lamenting degradation of the Colorado River Delta caused by diversions from the river, Mr. Kroesen stated, "taking more water from the river, perhaps even maintaining our current level of use, should not be an option." Mr. Kroesen urged caution in extending the non-potable system for conservation/demand management, arguing, "we should not, in our haste, dedicate all reclaimed water for these purposes. It is important to maintain effluent flow in the Santa Cruz River," and "it is time to expand the Conservation Effluent Pool and determine a system for actually implementing its use."

During Phase 2.3, Public Hearings, environmental advocates again addressed respect for the environment in support of the Phase II Report. The advocates supported the report's calls for respecting the environment; balancing the needs for water of the environment, people and the economy; and prioritizing riparian protection and restoration. The environmentalists advocated for advancing the Conservation Effluent Pool agreement between the city and county as a vehicle for protecting and restoring riparian habitat.

B. Living Within Limits Imposed by Finite Resources

Ron Proctor from Sustainable Tucson wrote, "We live in a world of limits." Madeline Kiser said, "nature is alive and has limits. Jenny Neeley from the Sierra Club said, "our water resources are finite and unreliable …" William Crosby from the Ecological and Cultural Conservation Organization defined sustainability as "not overusing our natural resources, which we posses for the future."

Finite resources and their limits are present day concerns, not speculation about possible futures. For the advocacy groups, uncertainty itself is a manifestation of these limits and a sufficient reason for corrective action (the "precautionary principle"). Madeline Kiser said we need to feel "a sense of urgency in these urgent times." Ron Proctor wrote, "the state of our natural ecosystem … is in a deteriorating and population pressures are accelerating the problem." Later, Mr. Proctor wrote, "Tucson is a desert community living beyond the carrying capacity of our local resource base." Trevor Hare from the Sky Island Alliance wrote, "we can grow but we must grow under the environmental constraints this amazing desert provides."

C. Focus on Conservation and Demand Management Before Securing New Water Supplies

On one level, conservation and demand management addresses cultural perceptions and personal behavior. Madeline Kiser told us "we need to consume less water, less everything." Tres English from Sustainable Tucson commented, "We don't talk about needs. We don't talk about priorities. We talk about demand." Mr. English talks about setting rights in and priorities for water: "there's a lot of things that we might want, and if you you've got enough money you can get it under our system …"

On a second level, Randy Serraglio from the Center for Biological Diversity argued that conservation and demand management means taking "a hard look at the excessiveness or inefficiency of our current water use." It means substituting rainwater harvesting, gray water systems, stormwater

harvesting, xeriscaping, and reclaimed water systems for the use of potable groundwater and surface water sources, recommendations included in comments by Madeline Kiser, Kendall Kroesen, and William Crosby.

On a third level, conservation and demand management involves balancing growth and sustainable water supplies. Randy Serraglio worried about defining sustainable water as a "'guaranteed supply sufficient to maintain unlimited growth." William Crosby spoke of "linking growth to sustainable water supplies." Trevor Hare wrote of the need to "implement land-use provisions and reform state law to ensure that future population growth and associated water needs do not exceed available supplies."

D. Avoid High Technology Solutions

Randy Serraglio identified the danger of a "myopic focus on large scale augmentation of supply." Mr. Serraglio worried that "water managers are willing to throw good money after bad in the narrow quest to augment supply, to acquire a "relatively small amount of water that may buy a little time, but certainly not solve the problem,' while we "continue to ignore cheaper, more reasonable and less damaging alternatives." As a case in point, Mr. Serraglio addressed desalinization, in particular the Yuma desalinization project.

Madeline Kiser spoke of a paradigm shift that "implicitly questions our current leading paradigm in Arizona that high-tech options, like effluent and desalinization, will allow more and more people to live here, as long as we have money and technology, we can defy nature's limits."

Jenny Neeley from the Sierra Club wrote that "proponents of growth … have a number of plans (including) desalinization, groundwater mining, and canal systems linking us to other, distant rivers, such as the Mississippi," which Ms. Neeley defined as "simply unsustainable."

E. Prioritize Local Water Resources over Imported Water

An issue related to high-tech solutions involves the search for non-local solutions to our water needs. Trevor Hare recommended, "we (must) also resist the urge to import un-sustainable and environmentally detrimental supplies of water from outside the Tucson Basin. The infrastructure and methods proposed so far to make more outside water available will have large un-reversible impacts to landscape and wildlife." Jenny Neeley worried that "utilizing water from faraway sources like this would directly contribute to the environmental devastation in other areas," and asked "How in the world is shifting the environmental damage to somewhere else a sustainable way to guarantee water supplies for new growth."

Looking at the Central Arizona Project, Jenny Neeley wrote, "we cannot rely on the Colorado River to supply a constant increasing demand for water..." Ms. Neeley wrote "Nor can we claim sustainability if we continue to drastically impact environmental resources to facilitate growth above the carrying capacity of our region."

Randy Serraglio spoke of a "neglect of local and regional responsibility for consumption" and our ignoring "more sensible and less damaging alternatives that are available locally," such as "admitting and addressing the folly of large-scale agriculture in the desert."

F. Energy, Carbon Footprints, and Climate Change

Ron Proctor focused closely the "consumption of fossil fuels," that "produces carbon dioxide undercutting the stability of our shared climate." In Mr. Proctor's view, "Carbon dioxide emissions should therefore be a major part of the sustainability equation." Mr. Proctor noted that "One way or another, a sustainable water system will require making sure the whole system satisfies carbon emissions goals," and "one obvious approach suggests creating a system that inherently requires less energy," such as "developing water supply that falls naturally at or near point of use (which) can use gravity to advantage, eliminating major environmental and energy costs."

Randy Serraglio noted that high tech solutions like desalinization "requires a tremendous amount of energy."Kendall Kroesen wrote that our Colorado River water "comes with a high energy cost and carbon footprint."

G. Dangers in Privatizing Water and Wastewater Systems

Linda Ellinor from Sustainable Tucson focused exclusively on what she sees as the "increased drive for-profit distribution and ownership and management of water." Ms. Ellinor reported that "the three big European water companies have bought out the three biggest American private water companies," and that "these companies and others are now running water systems in such cities as Atlanta, New Orleans, Tampa, Indianapolis, Oklahoma City, Stockton, Milwaukee, Springfield, Pittsburgh, Honolulu to name a few." However, what frightened Ms. Ellinor was that "the goal of these private concerns is to control 70% of the U.S. market within two decades."

Ms. Ellinor saw privatization as "every time" resulting in "waste, corruption, the cutoff of service to the country's poorest peoples, and problems of pollution and wastewater."

NEIGHBORHOOD STAKEHOLDERS

The Neighborhood Infill Coalition set the tone for the Neighborhood Stakeholders: "Our community is at a water crossroads and is facing some difficult decisions. … Tucson is balancing on the razor's edge." regarding our aquifer. Tracy Williams, from the Neighborhood Infill Coalition, noted there "is a lot we need to know about water" if the region hopes to create "a comprehensive strategy to acquire and deliver enough water." Neighborhood stakeholders addressed four themes: (A) Beware of dangers to the study; (B) Keep the process open and inclusive/Use the right experts; (C) Practice the precautionary principle; and (D) Pay attention to water quality.

A. Beware of Dangers to the Study

Neighborhood Stakeholders shared a strong sense of distrust of those "in charge" and of their claims for specialized expertise in water resource management. Neighborhood Stakeholders warned about special interests, regionalization, and Tucson Water, arguing they proceeded from biases that worked against appropriate water resource management.

The Neighborhood Infill Coalition argued for "a solid knowledge foundation that is free from special-interest influence." Tracy Williams worried about special interests that "line up to demand a seat at the table," bringing with them an "unbalanced approach to critical problem-solving (that) leads to the kind of distorted outcomes that helped create our current financial crisis." Colette Altaffer warned of

stakeholders attempting to steer the process in their direction. Ms. Altaffer referred to "parallels between the financial meltdown and Tucson's own political climate from the undue influence exerted on our politicians by special interests." Ms. Altaffer complained neighborhoods were afforded only minimal protection against the developers and had to fight for representation in the development process.

These advocates warned of dangers to central city neighborhoods inherent in regional participation. Ms. Altaffer worried that "elite people in the foothills and elsewhere" (will) "start establishing the agenda" and elected officials will "ignore us while the special interests get their way." The Neighborhood Infill Coalition wrote it is now becoming "clear why the region's other water utilities have been clamoring for a seat on this water committee … regionalization of water is the ultimate prize for them as it would allow them to tap into Tucson's deep aquifer and CAP allocation so they could continue (their) irresponsible growth patterns…"

B. Keep the Process Open and Inclusive/Use the Right Experts

Neighborhood Stakeholders demanded a process that was open, transparent and inclusive. Ms. Altaffer said, "Everyone, including neighbors, are stakeholders." Ms. Altaffer urged an "all hands on deck" approach to water resource planning, because "we can no longer accept that a handful of people know what is best for Tucson, while ignoring the vast untapped resource that is our citizens." Dianne Lett from the Feldman Neighborhood Association argued, "it was not acceptable to not have broad-based outreach to the community," suggesting several techniques for achieving outreach.

The Neighborhood Infill Coalition urged "the inclusion of a broad array of experts in the areas of water law, infrastructure and the environment" (to) "better understand the connections between hydrology, law, climate change and water delivery mechanisms/infrastructure," soliciting expert advice that would not be "limited to our region." The coalition identified several sources for this expertise: the US Geological Society; in several departments at the University of Arizona and Arizona State University; the Western Regional Climate Center/Desert Research Institute; the Pacific Institute; and, the Regional Integrated Science Assessment at the National Oceanic and Atmospheric Administration.

Judith Meyer from the Tucson Mountains Association urged the committee to acquire information about best practices and case studies from both national and international water jurisdictions, which would broaden the local "expert" knowledge base about water resource management and educate the community, policy makers, and elected officials.

C. Practice the Precautionary Principle

Ms. Altaffer urged adherence to the "precautionary principle," which she defined as "caution practiced in the context of uncertainty." Ms. Altaffer alerted the city and county to the danger they might "paint yourself into a corner." Practicing the precautionary will help us "avoid growing beyond our ability to sustain our community." It is a plea to not continue "down the path of growth as usual"; that we not "blindly pursue a megalopolis that stretches from Mexico to Prescott."

The precautionary principle is the basis for "careful management of (our) limited water supply," an approach to help us "avoid the mistakes of the past (and) prevent us from resorting to Draconian measures in the future to address potential water shortages." The precautionary principle is a risk analysis that compares the prospect of growth against water supply limits and uncertainties affecting supplies now and in the future. These advocates urged policy makers to recognize realities such as a "limited water supply"; an "over-allocated Colorado River"; and the uncertainty about global warming and long-term drought.

Tracy Williams argued we "need to control growth to achieve sustainability," and that "water supply should drive land use policy." Advocates urged the community to make permanent its interim policy of not extending water service beyond its current "obligated-to-serve" boundaries.

These advocates questioned "the long-term reliability of the Assured Water Supply designations."

The advocates described the Central Arizona Groundwater Replenishment District as simply a tool for protecting "the property interests of the development community by creating a myth of 'paper water.'" Ms. Williams predicted that the Central Arizona Groundwater Replenishment District is incurring obligations that it will not meet by "allowing too much growth," challenging the agency to document they will provide "100 years of firm supply."

Neighborhood Stakeholders worried particularly about our "appalling" treatment of the aquifer, calling us "poor stewards" who polluted the aquifer, drawing it down so low the Santa Cruz River no longer flows. These advocates singled out the Central Arizona Groundwater Replenishment District as a danger to the aquifer.

D. Pay Attention to Water Quality

Tracy Williams focused on water quality and human health. Ms. Williams said water was a necessity and not a luxury, so that water quality is an important issue. Ms. Williams argued the need for knowing a lot more about "contaminants of emerging concern" (i.e., pharmaceuticals and endocrine inhibitors).

Ms. Williams raised water quality concerns with the City's Graywater reuse ordinance, urging that Mayor and Council delay the ordinance until further study was completed and urged rainwater harvesting as a safer alternative to the same end.

INDIVIDUAL STAKEHOLDERS

Individual Stakeholders submitted one hundred and thirteen comments, collected under seven major themes: (A) Live within our means; (B) Emphasize rainwater harvesting, stormwater control, and conservation; (C) Tucson AMA regional perspectives, addressing other water utilities and jurisdictions, and addressing rural areas; (D) Protect water quality; (E) Recommendations on community outreach; (F) Distrust of government; and, (E) Address the energy/water nexus.

A. Live Within Our Means

Several Individual Stakeholders called for an ethic of learning to live within our means, of acknowledging and adapting to limits, as an alternative to simply growing bigger and wider. Jane Evans, decrying "uncontrolled growth," declared, "a growth-based economy is not sustainable in the Sonoran Desert." Charles Cole defined sustainability as avoiding "temporary overexpansion of human population beyond the carrying capacity of the environment, only to be followed by a "Catastrophic Collapse" as has occurred with past civilizations." Mr. Cole called for a "new paradigm that does not rely on perpetual growth." Mr. Cole urged us to "balance resource availability and use."

Diane Luety noted, "we have a limited water resource, live in a desert, and also cannot economically continue to use our money and labor resource to extend infrastructure beyond our current limits. We need to spend whatever resource we have to maintain our current water and sewer infrastructure."

Nancy Freeman defined sustainability as" living with our local resources."

Many individual commentators challenged claims of an "assured water supply," dismissing compliance by Tucson Water and other water utilities with the rules for obtaining that designation. Clyde Stagner questioned whether assured water supply calculations deduct losses to evaporation, which he maintains could be significant. A number of Individual Stakeholders questioned the reliability of Colorado River water as a local supply. Mr. Cole spoke of "uncertainties about future supplies" and "limits of present supplies.

Dale Keyes and others asserted that climate change and long-term drought would limit assured water supplies in the future. Mr. Keyes argued, "there is a consensus among climatologists that the southwest will be drier and warmer." Mr. Keyes, therefore, argued, "rather than calling climate change an uncertainty, the likely trends should be acknowledged."

B. Emphasize Rainwater Harvesting, Stormwater Capture, Conservation

Charles Cole placed a heavy emphasis on rainwater harvesting, while Nancy Freeman placed an equally heavy emphasis on stormwater capture as important tools of water resource management. Several individual commentators promoted conservation as a critical tool for water resource management, but none with the special emphasis Mr. Cole and Ms. Freeman brought to their subjects.

Rainwater Harvesting

Mr. Cole defined one water sustainability principle as being a system that "functions essentially without significant consumption of nonrenewable resources." Mr. Cole claimed that he and his wife have a rainwater harvesting system that allows them to "live off the grid," while providing them with 100 percent of their water needs.

At the September 10, 2008 meeting, at the request of staff and committee, Mr. Cole made a presentation on his rainwater harvesting system, which uses gutters all around the roof that captures the rain fall and directs it to downspouts that take the water into pipes underground and then to a 26,000 gallon underground cistern. Mr. Cole described a system of filtration that produces water for

indoor uses such as showering, flushing the toilet, washing, the dishwasher and clothes washer. For drinking water, they have a small reverse osmosis system under the kitchen sink.

Mr. Cole noted that they were entirely independent; that they had a seven-month supply of water in the cistern and were looking forward to the winter rains.

Mr. Cole noted that, while "as a national average 61% of rainfall almost immediately returns to the atmosphere through evapotranspiration," his system captures that 61% and puts it to use. Mr. Cole argued that, based on the evapotranspiration rates, capturing rainwater would not have negative impacts on aquifer recharge.

Stormwater Capture

At the October 15, 2008 meeting, Nancy Freeman made a technical presentation on stormwater recharge, at the invitation of the committee and staff. Ms. Freeman started by noting that ADWR claims there is a 40,000 acre-foot water deficit per year in the Green Valley/Sahuarita Area. Ms. Freeman showed slides of stormwater runoff damages in the area. Ms. Freeman noted she is not talking "about rainwater harvesting. This is serious stormwater and flooding." and argued that if we decide to treat stormwater as an asset rather than simply as a problem to be solved, then, as one of her slides said – "You want water – We've got water!"

Many of Ms. Freeman's examples involve multi-purpose stormwater retention/detention basins that provide attenuation of flood flows, but can also serve to recharge stormwater and provide recreational opportunities when it is not flooding. Ms. Freeman's examples were from Colorado, California, New Mexico, and in Arizona from Chandler and Tucson (Kino Environmental Restoration Project), as well as from Australia, which Ms. Freeman said was in the forefront of stormwater recharge.

Ms. Freeman recommended that we treat stormwater" as an asset …and …use (it) as recharge in some areas, and recharge the water where it is instead of moving it around, and paying for a lot of infrastructure."

Conservation

One Unidentified individual commentator urged Mayor and Council to support that Phase II Report because our "shining beacon has been our regional approach to conservation."

Clyde Stagner presented ideas for increasing water efficiency in the house by shortening the pipe between the showerhead and hot water heater and lowering the preset temperature on hot water heaters. Mr. Stagner recommended programs to decrease evaporation losses as a strategy for increasing the water efficiency of outdoor uses.

Four individual commentators urged raising water rates high enough to send a price signal on the value of conservation. Leona Davis wrote, "I would propose that creating a highly-tiered usage rate would drive an even more dramatic increase in water use efficiency." Jeanne Bruckner wrote, "water rates should be a reflection of usage. The more you use, the more you pay."

Four individual commentators raised cautions about conservation. Ms. Davis defined conservation education programs as "largely ineffective." Carol West pointed to a tension between (a) not being able to "scientifically tell how much groundwater we have," which leads to needing "stronger conservation and water harvesting programs" versus (b) "with less water usage, utilities sell less water and that does affect their bottom line." To Ms. West, water harvesting, conservation, and gray water use "only nibble around the edges," preferring instead that Tucson work with SAWUA and ADD Water to acquire additional water resources as a higher priority. Priscilla Robinson would replace the term "conservation" with the term "efficiency," which she preferred because it "suggests using something to maximize the benefit from what is expended, but acknowledges that it is being used," which Ms. Robinson sees as more productive than "appealing to people's better natures."

One Unnamed individual suggested that "for the goal of 'lower water consumption per household,' be sure that implementation is confined to voluntary methods with positive incentives, rather than punitive command and control regulations."

C. Address Tucson AMA Regional Perspectives

Seven individual commentators addressed the regional perspective. Six Individual Stakeholders addressed regionalism from the municipal perspective of other jurisdictions and water utilities. Nancy Freeman focused on the water needs of rural areas.

Other Jurisdictions And Water Utilities

Carol West and Priscilla Robinson commented extensively on regionalism, from the perspective of other jurisdictions and water utilities. Ms. West said, "water is a regional issue," while Ms. Robinson saw "the central flaw in the entire report" as "the decision to limit the discussion to the City and the County…" Both Ms. West and Robinson argued the Phase II Report was not accounting for all of the water in the Tucson Active Management Area. Ms. West said, "we often fail to recognize that this region has CAP allocations totaling about 260,000 acre-feet," Ms. Robinson used the figure of 262,400 acre-feet.

For both Ms. West and Robinson, a central water problem in the Tucson AMA is that the holders of these allocations are not taking their full allocation. Ms. West said, "progress on this is urgent," and noted, "we are paying for water we are not using and allowing others in the state – and yes, throughout the west - to use it." For Ms. West "supply problems will dominate this region," and "planning for the future is essential: that involves working with the entire region."

Ms. Robinson calculated that CAP allocation holders in the Tucson AMA were not taking 118,490 acre-feet of the region's CAP allocation. Ms. Robinson argued it is "not possible to achieve anything close to balancing the water budget in the TAMA without using that water. Every acre-foot of CAP water that we do not take means that irreplaceable groundwater is being used instead."

Marshall Magruder, a resident within the Santa Cruz Active Management Area (SCAMA) noted SCAMA faces a "'natural' limit on a sustainable population," which he estimates to be an additional 31,000 people, at which point "we will not be able to sustain our water resources." Mr. Magruder stated

that he is "very concerned that our neighbor to the north is not maintaining its water resources in a responsible manner."

Mike Nicksic argued that the "Committee vastly rethink the scope of the study." For example, Mr. Nicksic asked whether the Joint Study would develop an inventory of water users that included institutions like the University of Arizona, Davis-Monthan Air Force Base, and various hospitals and nursing homes with grandfathered groundwater rights. Mr. Nicksic requested more information about the University's plans for "mega expansion for Kino Boulevard, with a potential of 15,000 to 20,000 water users." Mr. Nicksic stated the committee needed to consider Nogales, Sonora and its relationships to the Joint Study.

Unidentified Individual 3 commented, "we live in a desert with dwindling water resources. A regional body to deal with water issues makes the most sense." Specifically, this individual recommended "a Regional Government Water Authority (with) the power and/or resources to enforce retrofit for all individual living quarters (in multi-family structures) with individual water meters."

Unidentified Individual 5 wrote that they were "puzzled about why this effort appears to be focused entirely on the City of Tucson and Pima County." The writer asked why other municipalities and private water companies were not involved, arguing, "it is premature to begin making any recommendation on developing a plan until the regional stakeholders are involved …"

Water Needs of Rural Areas

Nancy Freeman requested the Joint Study to expand the study area to be inclusive of all watersheds in the region. Ms. Freeman viewed the 1980 Groundwater Management Act as beneficial to agricultural and mining interests and creation of the Central Arizona Groundwater Replenishment District as beneficial to developers, but saw neither as protective of groundwater supplies and safe yield in general or the adequacy of water supplies in rural area in particular. Ms. Freeman related that in 2006 and 2007, a group of fifty people from around Arizona committed their time to study rural water needs that resulted in proposed legislation to secure adequate water supplies in rural area. Ms. Freeman noted the legislature failed to pass any such legislation.

Ms. Freeman criticized Tucson Water and Pima County Regional Wastewater Reclamation for being more focused on the central urban core and less focused on the outlying areas of the metropolitan area. For example, Mr. Freeman characterized Tucson Water service delivery to the Kolb Road-Sahuarita Road region as "further encroachments into the rural residents."

D. Protect Water Quality

Clyde Stagner submitted several oral and written comments during Phase 1.2, Technical Presentations, focusing on water quality, primarily from a human health perspective.

Mr. Stagner particularly focused on accusations that "the Tucson Water department is presently serving the citizens of Tucson tertiary treated recharged water from Las Vegas and Lake Mead." Mr. Stagner argued that treated wastewater from Las Vegas/Henderson Nerada is returned to Lake Mead, from where it is discharged into the Colorado River, shipped via the Central Arizona Project and then on

to Tucson. Mr. Stager stated, "Tucson does not drink pure Las Vegas waste (but) Tucson's CAP contains their wastewater (diluted) and Tucson Water's CAP blend contains their waste water (further diluted)." Mr. Stagner claimed that the daily intake of perchlorate in Tucson exceeds certain standards.

Mr. Stagner referenced problems associated with salt in CAP water, which he said reduces the life of household appliances. Mr. Stagner claimed the CAP in 1997 delivered 1.1 million tons of salt with 1.4 million acre –feet of water. Mr. Stagner estimated we import 116,116 tons of salt with 148.2 million acre-feet of CAP water.

Charles Cole recommended as one principal of water sustainability that "it is essentially pollution-free in all aspects of its operation and has no negative impacts on the environment." Later, Mr. Cole asked whether "new treatment systems for water and wastewater will eliminate pharmaceuticals and herbicides."

Unnamed Individual #2 worried about "the elephant in the room that the committee has failed to address (which) is the issue of CAP water and salt." Reviewing data on the volume of salt transported in Tucson Water's full CAP allocation, this individual complained, "no one has been willing to publicly address this issue," which "gets swept under the rug." For this individual, salt in CAP water was "a pay now issue (build a desalinization plant) or a pay later issue (health and/or home repairs)."

E. Recommendations on Community Outreach

During Phase 1.1, Getting Started, Margot Garcia and Dale Keyes made detailed recommendations about conducting community outreach (At the request of the oversight committee, Ms. Garcia and Mr. Keyes contracted to produce a report on the sustainability discussions.

Ms. Garcia focused on the mechanics of how to "negotiate the political and technical issues of regional water planning." Ms. Garcia said a "key to balancing widely opposing views was the use of professional organizations" (who were able to use) "knowledge and professional expertise to keep the many different viewpoints from making extreme statements."

Dale Keyes told the committee there was a spectrum to community input, from information through consultation to collaboration. Mr. Keyes noted the committee had seniors, males and Anglos, and suggested broadening the committee to include "other representative parts of the community." Mr. Keyes recommended the committee adopt a public involvement plan and follow through on it; hold meetings at convenient times and locations; keep meetings structured but also be flexible with agendas; and avoid "process fatigue" in the larger community.

F. Distrust of Government

Nancy Freeman and Clyde Stagner expressed strong distrust of government.

Ms. Freeman blamed the state legislature for passing a Groundwater Management Act that makes it impossible to achieve water sustainability in municipalities and for refusing to act on the rural water needs legislation. Ms. Freeman criticized the Central Arizona Groundwater Replenishment District as a tool of developers and a hindrance to protecting groundwater supplies. Ms. Freeman wrote, "So,

the first step of living within our means with the limitations imposed on us by importing CAP would be to eliminate the Groundwater Replenishment District, which was created by and for the sake of new development

Ms. Freeman complained about "misleading" information she believes Tucson Water disseminated regarding rising groundwater levels and about the utility's desire "to be the water company of the world."

Regarding the City's Graywater reuse ordinance, Mr. Stagner characterized the ordinance as "the elected leaders of Tucson (claiming) to know what the dictatorial best is for the disorganized citizens of Tucson."

Mr. Stagner repeatedly recommended creation of an independent water quality department, independent of both Tucson Water and County wastewater. Mr. Stagner claimed Tucson Water was not doing an adequate job of water quality monitoring and testing. In one comment, he asked who the "science caregivers" in Tucson are. Regarding contaminants of emerging concern, Mr. Stagner asked, "What has Tucson Water done about these pollutants? Is 'There are no MCLs' an answer? Is 'AZDEQ's responsibility' an answer when Tucson Water is responsible for the potable water for Tucson citizens?" Mr. Stagner requested more transparency from both utilities, arguing that both needed a new mindset that valued more data and an adaptive management strategy.

G. Address the Energy/Water Nexus

Terry Finefrock submitted two written comments largely focused on water and energy. In a November 11, 2009 comments, Mr. Finefrock said he "did not see and would strongly suggest that the study identify and discuss the connection between existing Brown electricity generation and water usage: ½ to ¾ gallons of water now used to generate one kilowatt-hour of electricity." Mr. Finefrock stated, "Solutions for water and environmental and cost issues involved with the generation of electricity will create many undesirable conflicts and seemingly mutually exclusive choices and significantly burden the capacity for the local economy to find the solutions."

BROADER GEOGRAPHIC PERSPECTIVES

Participants with a broader geographic perspective submitted forty comments, which were sorted into five major themes.: (A) Profile of water demand and supply in the Tucson AMA; (B) Is there enough water in the Tucson AMA to meet demand: (C) Acquiring new water supplies: (D) Acknowledge climate-related water resource uncertainties; and, (E) New paradigms for water resource planning and management

A. Profile of Water Demand and Supply in the Tucson AMA

At the June 25 and September 24, 2008 meetings, Jeff Tannler and Laura Grignano, from the ADWR Tucson AMA office, provided a profile of water demand and supply in the Tucson AMA. The Tannler and Grignano presentations were important for data they provided on the water use context in the AMA beyond the data provided by staff particular to Tucson Water.

There are five water user sectors in the Tucson AMA: municipal, agriculture, industrial, Indian, and the environment. There are four sources of water: groundwater, CAP water, other surface water, and effluent.

Based on 2006 data, total water demand in the Tucson AMA (excluding environmental use) was 346,298 acre-feet. Of this amount, the majority of demand was generated from the municipal sector (193,468 acre-feet or 56% of total demand), compared to agriculture at 87,755 acre-feet (25%); industrial at 53,397 acre-feet (15%); and Indian at 11,678 (3%). Based on Tucson Water data on water demand by sector from 1941 to 2006, agriculture was the dominant water sector in 1941, at approximately 97% of use. By 1986, the municipal sector exceeded agriculture in water demand, progressively expanding its share of AMA water to 56% by 2006.

In 2006, groundwater supplied 222,999 acre-feet of that year's demand, (64.4% of the demand). CAP provided 88,264 acre-feet of demand (25.5%) and effluent 16,031 acre-feet (4.6%). The ADWR data showed different profiles of water supply by sector. For example, in 2006 the municipal sector received 54% of its supply from groundwater and 37% from CAP water. The agriculture and industrial sectors, on the other hand, received almost all of their water from groundwater. The Indian users receive virtually all of their water from the CAP.

B. Is There Enough Water in the Tucson AMA to Meet Demand

Three presenters either directly or indirectly asked the question of whether we have enough water in the AMA. Two presenters answered "No" and one answered "Yes."

Jeff Tannler and Laura Grignano (Tucson AMA) answered "No," assuming the question is whether the Tucson AMA will attain "Safe Yield" by 2025. In his presentations, Jeff Tannler noted that the "Declaration of Policy" in the Groundwater Management Act, "the Arizona Legislature concluded quite clearly that over-reliance on groundwater in the most urbanized areas of the State was threatening to place Arizona's economic future in danger." To solve this threat, the Groundwater Management Act set as a statutory goal for the Tucson AMA to "attempt" to reach "safe yield" by 2025.

Mr. Tannler presented data on the amount of overdraft in the Tucson AMA from 1996 to 2006. In 1996, overdraft in the Tucson AMA was almost 235,000 acre-feet, declining to approximately 223,500 acre-feet in 2000. In 2001, the overdraft declined to just over 190,400 acre-feet and in 2006 had declined again to approximately 129,600 acre-feet.

Regarding attainment of safe yield by 2025, Ms. Grignano reported that the Third Management Plan for the Tucson AMA projected an overdraft in that year of "close to 50,000 acre-feet."

Ken Seasholes, from the Central Arizona Project, also answered "No," in the long-term for the three county CAP service area. (CAP) At the October 15, 2008 meeting, Ken Seasholes described the ADD Water ("Acquisition, Development and Delivery) project of the Central Arizona Project.

Mr. Seasholes presented a slide identifying The Central Arizona Project's "problem statement" that led it to undertake the ADD Water project: "Long-term water demands in CAP's three-county

service area are projected to exceed currently available supplies. A comprehensive strategy may be desirable for the acquisition and delivery of water to meet these future demands." Mr. Seasholes explained that the problem statement "doesn't mean that we're about to run out of water. It means … there needs to be additional acquisition if we're going to meet those demands as they come along."

As Mr. Seasholes made clear, the ADD Water project seeks to prepare for water shortages (demand exceeding supply) in the three-county CAP service area (Pima, Pinal, and Maricopa counties) that will occur in the future, but are not occurring today. "

Sharon Megdal, from the University of Arizona's Water Resources Research Center, answered "Yes" for the municipal sector in the Tucson AMA, assuming that the question is "If we use the water that's known to be available to the region, how many people can be supported by that water supply?"

In July 2006, Sharon Megdal from the Water Resource Research Center released a report titled Water Resource Availability for the Tucson Metropolitan Area, commissioned and funded by a group of business interests that in 2008 formed the Tucson Regional Water Coalition. Dr. Megdal presented the results of her study to the October 2, 2008 meeting. Dr. Megdal focused only on the municipal sector.

Dr. Megdal did not attempt to provide a single, unequivocal answer to her research question. Instead, Dr. Megdal clearly explicated all of the assumptions she settled upon to quantify the principal variables in her equation – levels of demand and supply.

Based on her analysis, Dr. Megdal concluded there is more than enough water in the Tucson AMA to sustain populations in excess of the 1.5 million people the Pima Association of Governments projects living here in the year 2030.

C. Acquiring New Water Supplies

The Central Arizona Project, having already determined that demand will exceed supply in the future, has taken the lead on securing new water supplies through its ADD Water process. Ken Seasholes from the CAP, made a presentation to the Joint Study on ADD Water.

In his presentation, Mr. Seasholes referred to the Central Arizona Groundwater Replenishment District's Plan of Operation (Plan), which identified "a potentially available portfolio of supplies" of new water of approximately of between 900,000 and one million acre-feet. Exhibit 7 - 4 below reproduces The Plan identifies three sources of "a potentially available portfolio of supplies," which are Colorado River water, imported groundwater, and effluent.

Colorado River Water

Arizona has rights to 2.8 million acre-feet of Colorado River water per year. The Central Arizona Project is entitled to 1.5 million acre-feet of Colorado River water and entitlement to the remaining 1.3 million acre-feet is allocated to Indian and agricultural users adjacent to the Colorado River. The Plan estimates that 532,046 acre-feet would be available from Colorado River water. The Plan estimates that Indian entitlements to CAP water would supply 158,300 acre-feet and on-river supplies would supply another 318,000 acre-feet. CAGRD acknowledges that a projection of potentially available Colorado River water assumes continuous "normal year" deliveries of water by the Bureau of Reclamation.

Imported Groundwater

In its Plan, CAGRD notes, "there are a limited number of basins outside of the AMAs from which groundwater may be imported for use by CAGRD to meet its obligations in the Phoenix, Pinal and Tucson AMAs. Those basins include Butler Valley, McMullen Valley and Harquahala Valley," which lie to the west and north of Phoenix, in northwest Maricopa County and in La Paz County. The Plan assumes "Imported groundwater" amounts to 181,000 acre-feet of new water (20%) of potentially available new water in the Plan of Operation.

The Plan acknowledges, "Importation of groundwater from any of these basins will require compliance with a number of statutory restrictions and limitations, as well as negotiated agreements with the owners of existing lands to which groundwater rights are appurtenant."

Effluent

The CAGRD Plan of Operation notes, "Although most of these municipalities plan to ultimately use most or all of the effluent they generate to meet their own AWS requirements, it is anticipated that some effluent could be made available for use by CAGRD through mutually beneficial arrangements with those municipalities." The Plan of Operation assumes 205,000 acre-feet per year (22%) of effluent being potentially available.

D. Acknowledge Climate-Related Water Resource Uncertainties

Dr. Julio Betancourt (USGS) and Kathy Jacobs (Arizona Water Institute) made presentations on climate-related uncertainties at the September 10, 2008 public meeting.

Dr. Betancourt noted that "climate-related uncertainties" include two issues: climate variability and climate change due to global warming. Dr. Betancourt noted that, as the Tucson AMA transitions to Colorado River water as a major supply, we become more vulnerable to climate-related uncertainties.

Dr. Betancourt began with a discussion of "Decadal to Multi-Decadal" climate variability (D2M), which he defined as "long intervals when the precipitation or the stream flow observations remain either above or below the mean for a few years or a few decades." Dr. Betancourt presented a slide that shows this "D2M" process for the years 1200 to 2000. Dr. Betancourt said the chart demonstrates that the Colorado River Compact was signed during a wet period in the early 1900s, resulting in an over-allocation of the river.

Dr. Betancourt then turned to the subject of climate change in the southwest. Dr. Betancourt told the committee that, since the 1980s, there has been a 1 ^{o} C increase in temperature at lower elevations and a 2 ^{o} C increase in temperature at higher elevations. Dr. Betancourt stated, "the southwest is actually in the crosshairs" of climate change. Dr. Betancourt identifies some of the climate related changes that are responses to this warming trend: "longer and hotter growing seasons, less snow pack, earlier snow melt and stream flow, more large fires, more extensive bark beetle outbreaks, etc. All these things tie together to this advance in the onset of spring and a longer growing season, things like we're getting a greater proportion of precipitation as rain rather than snow higher up all of these mountains, which are, basically, the water towers we depend on."

Kathy Jacobs, referring to the recent International Panel on Climate Change (IPCC) report offered the following conclusions: “The warming is unequivocal. There is no doubt whatsoever that the globe is warming. ... More important to me was that for the first time the IPCC said that the southwest is not just getting warmer, it may actually get less precipitation as well.”

E. New Paradigms for Water Resource Planning and Management

Water resource planning is a complex practice, not readily pigeonholed into a few simple compartments. It is safe to say, however, that water resource planning, as practiced within the provider community, has focused traditionally on a straightforward paradigm: demand drives supply, with the providers responsible for securing enough water to meet whatever the level of demand. Julio Betancourt from the U.S. Geological Survey and Kathy Jacobs from the Arizona Water Institute presented aspects of a “new paradigm” for water resource planning and management.

Dr. Betancourt argued, “the regional climate has exited the envelope of natural variability and the past no longer is indicative of the future.” Dr. Betancourt also said, “water planning has generally glossed over the problems caused by Decadal to Multi-Decadal climate variation. If we have not adapted to this kind of natural variability, that’d going to make it that much harder to adapt to climate change.” Dr. Betancourt stated that since “the assumption that the future is going to look like the past” is no longer applicable, then … much of the fundamental assumptions that we’ve used in water planning and water management worldwide are now violated by this particular phenomenon.”

Ms. Jacobs followed up on Dr. Betancourt’s obituary for stationarity with a discussion of “adaptive management” as the new paradigm for water resource management. Ms. Jacobs presented a definition of adaptive management:

> **“Adaptive management** (AM), also known as **adaptive resource management** (ARM), is a structured, iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management. AM is often characterized as ‘learning by doing.’"

THREE RECURRENT THEMES

Stakeholders tended to concentrate themselves into opposing camps focusing on three recurrent themes that I observed in the record of public comment: (1) is growth good or bad, or simply inevitable; (2) what is the proper paradigm for water and wastewater resource management and (3) "having a seat at the table" versus the value of participation thorough public outreach.

IS GROWTH GOOD, HARMFUL, OR SIMPLY INEVITABLE

Growth is an inescapable topic of conversation, almost regardless of the original topic. It is hard to imagine any discussion of issues important locally that does not center on an almost visceral evaluation of Growth - Is growth a good outcome; simply an inevitable outcome; or a harmful outcome?

Good Outcome ⟷ Simply Inevitable ⟷ Harmful Outcome

Growth is a two-pronged issue: (1) how many people are or should live here (population size) and (2) how do and should we live here (urban form). These two aspects of growth are separable theoretically and practically, and yet people often switch their term of reference about growth, often without alerting their listeners to the switch.

During the joint study, many public comments, as well as comments from the oversight committee, expressed a positive view of growth, that it produces a good outcome. From this perspective, more new people, and more new housing for them to live, in translates into more wealth for the community and adds to the economic security of the community. For those in this camp, the market should guide urban form, not governmental fiats. People have housing preferences and they will purchase their preferences. "Sprawl" is just a pejorative term for consumer choice.

Trevor Hare (Sky Island Alliance), quoting "an old friend" who said, "Growth for growth's sakes is the ideology of a cancer cell", succinctly stated the viewpoint of the "Harmful Outcome" camp. From this perspective, growth in the form of population size the central problem of the community. Many people believed either there already was or there certainly will be too many people living here. Too many people simply override the limits of nature, the carrying capacity of the ecosystem, and quality of life of those already here. Our population size is or soon will be unsustainable.

Many in the "Harmful Outcome" reject or are deeply suspicious of changing urban form to mitigate the pressures of population size. In this context, urban form means how we settle the community and how we consume our resources. Increased residential and non-residential densities can threaten existing neighborhoods. New pattern of demand management (increased conservation, rainwater and stormwater capture, drought resistant landscaping) are simply pretexts for allowing more people to move into the community. Sooner, rather than later, we need to recognize that too many people are the central threat to the community.

I observed a third camp in the good to harmful continuum, which I label the "Simply Inevitable" viewpoint on growth. People in this camp avoid moral judgments about growth, whether it is good or harmful. They maintain that growth will occur, that it is inevitable, and the central challenge is how well

and how quickly we prepare for it. These people saw growth (population size) as inevitable, but with two principal caveats that distinguish them from those in the Good Outcome camp.

First, people in this camp believe sustainability is a real issue that we must address with determination, but they do not believe the sky will fall in anytime soon. They believe that unless we change directions on urban form (development patterns and resource consumption patterns), population size will become unsustainable. Linking land use planning and water resource planning is critical. Advancing conservation is critical. Switching away from potable water to rainwater and stormwater harvesting, and using reclaimed water, is critical. Securing new potable water supplies is critical, but finding the revenue to pay for water that will become more expensive is also important. Smart management of existing and future water systems is critical

Second, people in this camp believe that growth is inevitable, but that there are limits to how this our community will grow. These people subscribe to the **S**-curve model of population size. According to this view, at some point in the future the population size of the community will plateau, reaching an upper limit. After this plateau is reached, population size may vary around this level, increasing in some years and decreasing in others. No one hazarded a prediction of when we would reach this plateau or what the upper limit on population size is. My view is that many people anticipate that the plateau will be reached in our lifetime, depending upon how old you are right now. If you have a current life expectancy of 70 years, you should live to see population growth level off.

COMPETING PARADIGMS FOR WATER AND WASTEWATER RESOURCE MANAGEMENT

A "paradigm" is a philosophical or theoretical framework, an organized thought pattern, to which people subscribe and adhere. A "paradigm" helps people determine what is important and what is unimportant; what is true and what is false. A "paradigm" can be likened to "the box" that some people "think inside of" and others "think outside of."

I have summarized public comment along a "paradigmatic" axis between a "Prevailing Paradigm" and a "Challenger Paradigm" of water resource management (see Exhibit 3). The two paradigms differ primarily over what does or should come first: Should Demand drive Supply; or should Supply limit Demand? Is Supply readily manageable and expandable to satisfy whatever the level of Demand; or is Supply inherently limited by its "carrying capacity"?

Prevailing Paradigm

The Prevailing Paradigm is most characteristic of Local Water Utilities/Jurisdictions, Business Stakeholders, and of representatives of Arizona Department of Water Resources and Central Arizona Project. This paradigm concentrates on the fundamentals of acquiring, developing and delivering Supply; and on sound management and technological expertise. The Prevailing Paradigm would be found on the Growth evaluation axis toward to Good Outcome side, with many representatives at least evaluating Growth as a Fact of Life Outcome.

Exhibit 7 Elements of the Prevailing and Challenger Paradigms of Water Resource Management

Prevailing Paradigm	Challenger Paradigm
DEMAND → SUPPLY	Primacy of Environment's needs for water
ECONOMIC NEEDS → DEMAND	SUPPLY limits → DEMAND
Primacy of the Municipal Sector	Climate uncertainties
Augment SUPPLY to overcome shortages	Energy/water nexus (costs)
Importation of SUPPLY	Water Quality
Reallocate Arizona's Colorado River water	Practice the Precautionary Principle
Import Groundwater	Demand management before New SUPPLY
High Technology Solutions	Local SUPPLY before imported SUPPLY
Desalinization	Avoid High technology solutions
Cloud Seeding	

Water utilities are responsible for delivering SUPPLY to meet DEMAND, not in limiting or otherwise affecting the level of DEMAND. Water utilities exist to manage SUPPLY wisely and with technological proficiency. SUPPLY is to be delivered effectively and efficiently. Economic efficiency is the requirement of delivering scarce SUPPLY to the most economically productive DEMAND, to those uses that yield the highest cost-benefit ratios.

The Prevailing Paradigm recognizes scarcity of SUPPLY (where DEMAND always exceeds SUPPLY), but views the solution to scarcity to be economic rationality in allocating SUPPLY, which must go to the "highest use." For example, the Prevailing Paradigm would prioritize municipal uses over agricultural uses, and would prioritize Supply for economic uses over Supply for environmental needs.

The Prevailing Paradigm also recognizes SUPPLY shortages (where SUPPLY cannot meet the most important DEMAND), typically as a future condition, with the appropriate solution being augmentation of SUPPLY – the acquisition, development, and delivery of new sources of SUPPLY. Typically, in the Prevailing Paradigm, augmentation means importation of SUPPLY or through "high tech" innovations, such as desalinization.

Challenger Paradigm

The Challenger Paradigm is most characteristic of the Environmental, Neighborhood, several of the Individual stakeholders, and some representatives of the Broader Geographical Perspectives. The Challenger Paradigm is focused on developing a "bigger picture" of water resource management than that of the Prevailing Paradigm. The Challenger Paradigm questions the singular focus on SUPPLY management and augmentation; questions the assumptions on which the Prevailing Paradigm relies; and would substitute the prevailing assumptions with many more assumptions about limits to SUPPLY and how those limits should, and eventually will, limit DEMAND.

The Challenger Paradigm would concentrate on the Harmful Outcome side of the Growth evaluation axis, with some representatives tending toward the Fact of Life Outcome position.

The Challenger Paradigm starts with an insistence on meeting the environment's need for water: with seeing the environment as a user of water, not simply as a source of water, with claims to scarce SUPPLY on an equal footing with municipal users, as well as agriculture and industry.

The second pillar of the Challenger Paradigm is that limits on SUPPLY (its "carrying capacity") should, and eventually will, limit growth in DEMAND. From this perspective, our profligate use of water already has destroyed valuable riparian habitat on several rivers and streams and led us to overdraft the aquifer continuously since the 1940s, with no end in sight.

The Challenger Paradigm sees multiple opportunities balancing DEMAND and SUPPLY other than augmentation of SUPPLY. This point of view prioritizes conservation, rainwater harvesting, stormwater capture, and graywater reuse over acquiring new SUPPLY. The paradigm prefers local water supplies to imported water. In addition, the paradigm opposes "high tech" solutions.

The Challenger Paradigm believes SUPPLY is fragile and uncertain. The paradigm does not assume "renewable" sources of SUPPLY are automatically available and guaranteed for life. The paradigm gives strong credence to the processes of global warming, climate variability, and climate change. The paradigm uses the term "uncertainties" related to SUPPLY, but actually views these processes, and other limits on SUPPLY, as certain and immediate.

HAVING A SEAT AT THE TABLE

The Joint Study was a dialogue between the City of Tucson and Pima County about issues over which both jurisdictions were the ultimate decision-makers, particularly about the issues of water, wastewater and land use planning. Local Water Utilities/Jurisdictions, Business stakeholders, and some Individual stakeholders strongly objected to a Joint Study that included only the city and the county and an oversight committee of existing city and county citizen committees.

Their objections were not to the public outreach process *per se*. They objected to not "having a seat at the table." Having a seat is reserved to those interests with the power to set the agenda; control the production and dissemination of information; call and manage public meetings; formulate and vote on policy and recommendations,; and write the reports. For the Joint Study, only the city and county

had “a seat at the table” and no amount of public outreach would assuage the feelings of stakeholders who objected to being denied their rightful “seat at the table.”

The scope of work for the Joint Study approved by the city and county envisioned a regional dialogue following completion of Phases I and II. Many stakeholders, however, rejected this phasing, arguing that issues in Phases I and II were inherently regional in nature and could only be satisfactorily resolved with the right entities “at the table.” Some stakeholders argued that the city/county focus in Phases I and II could impede a true regional dialogue.

The Environmental, Neighborhood, and Individual stakeholders did not adopt this “seat at the table or else” point of view. At the end of Phase II, many stakeholders strongly supported the public outreach process as accessible, transparent, and comprehensive. These stakeholders, however, brought high levels of distrust to the process. They distrusted the Business stakeholders especially, typically referring to them as the “growth lobby” (for them a pejorative term). These stakeholders also distrusted Local Water Utilities/Jurisdictions (including the city and county), who they saw as all-too-willing enablers of the “growth lobby.”

These stakeholders saw conflicts between the environment and growth; between existing residents and new residents; between core city residents and suburban residents. One participant saw a conflict between urban and rural residents.

This discussion of “seats at the table” versus public outreach is not just about process, it deeply affects substance as well. For example, in the run-up to the Paris peace talks to end the Vietnam War, the negotiators wrangled for months over the shape of the conference table. Looking at any upcoming regional discussions (negotiations) on water and wastewater, allocating “seats at the table” (regardless of the table’s shape) will influence, if not predetermine, substantive outcomes. For example, if the “seats at the table” are filled by those subscribing to one the competing paradigms described above, that paradigm will predetermine the agenda and likely outcomes of the regional dialogue. Other questions of substantive affect are “Will (or should) “seats at the table” be reserved only for those entities will real decision-making power about water and wastewater (jurisdictions and private water utilities)? Another question would be “How will differences in size be handled (i.e., Tucson Water serves 75% or the municipal water market and Regional Wastewater Reclamation serves over 90% of the wastewater demand). A third question would be “Are “seats at the table” reserved only for those from the municipal sector or will the Indian, agricultural, and industrial sectors be seated as well? And, fourth, will the environment have “a seat at the table:?