

Joint City/County Water and Wastewater Study

Summary of Committee Input on Sustainability

(Excerpted from Committee Statements, see Appendix __)

Overarching Principles

Definitions and use of "sustainability"

*Wikipedia: "In an **ecological context**, sustainability is defined as the ability of an ecosystem to maintain ecological processes, functions, biodiversity and productivity into the future. In a **social context**, sustainability is expressed as meeting the needs of the present without compromising the ability of future generations to meet their own needs. When applied in an **economic context**, a business is sustainable if it has adapted its practices for the use of renewable resources and is accountable for the environmental impacts of its activities.*

"Sustainability" is defined by Alley, et. al. (1999) is, "... managing (ground water) in a way that can be maintained for an indefinite period of time, without causing unacceptable environmental, economic, or social consequences." Assuming that the destruction of riparian areas is an unacceptable consequence to the citizens of eastern Pima County, then simply replacing gallon-for-gallon the ground water pumped from an aquifer with natural and artificial recharge is not enough: safe-yield does not equal sustainable yield.

Sustainability is inclusive of all dimensions of life and as such constitutes a cultural shift in worldview and governing framework. Sustainability is comprehensive, encompassing all five domains of reality: material, economic, biologic, social, and spiritual

At its base, sustainability is the capacity to continue a desired condition or process either social, ecological or both. Resiliency is the ability of a system to adjust its configuration and function under disturbance. Both concepts are important as we seek to ensure an adequate and unbroken supply of high quality municipal water to area residents and businesses and an effective and safe wastewater system which can function under changing conditions.

At a pragmatic level, considering sustainability entails the answering these bounding questions: "of what, for whom, for how long, and at what cost?" So understanding our values is just as important as understanding nature. This leads to a synthesis definition informed by both ecological and social science: "Sustainability is maintaining, or fostering the development of the systemic contexts including both ecosystems and the built environment that produce the goods, services, and amenities that people need or value, at an acceptable cost for as long as they are needed or valued. "

A sustainable water population starts with a conscious effort to balance effective and efficient use of water resources in an equitable manner. Such an effort begins with a commonly accepted direction established by stakeholders that balances short-term visible outcomes and the development of long-term policies that protect individual rights. A

truly balanced approach also recognizes the needs and concerns of unrepresented stakeholders such as future residents and the environment.

The human sustainability challenge has two parts: 1) Restoring the regenerative capacities of natural ecosystems. 2) Transforming the economy and built-environment based on regenerative design principles and replacement of fossil fuel-based energy systems with renewable energy systems.

First let's start by looking at what the City and the County already endorse in their respective sustainability plans -- the most often- adopted definition: "Sustainability is meeting the needs of the present without compromising the ability of future generations to meet their own needs." What is important about this definition is that we have to consider the needs of the future. What is also productive is that considering this definition leads people to the logical conclusion that almost everything we do is fundamentally unsustainable because we are depleting non-renewable resources at irreplaceable rates everyday. While this definition may be effective in raising awareness about unsustainability, it provides no guidance or tools to move forward.

Sustainability as to water in Pima County environs means enough water for now to meet the projected population over say the next 20-30 years through conservation, re-treatment of sewage and new sources. Over the longer period of say 30-50 years, a new assessment of all factors above in say 10-20 years again to estimate is there enough to sustain the newly projected population for several decades. If the estimate that after x years , there is not enough, then we face a decision on say the huge cost of desalination / import of sea water with the long lead construction timing or restriction of population growth by whatever means.

Sustainability of water consumption is an oxymoron if not associated with the following four criteria:

- Rate of resource use
- Number of resource users
- Length of time the resource will be used
- Basic human right to safe potable water

The fourth criterion in the list is the most important. However, it will require a paradigm shift in the way our society considers water use. Water is currently considered a commodity to be sold and distributed, often at a profit. Instead, it should be treated as one of the essential foundations of life. It is my opinion that clean water, along with unpolluted air, nutritious food and decent shelter should be considered basic human rights, not commodities available only to those who can best afford them. When considering sustainability in this context, conservation becomes a matter of moral necessity.

Sustainability means living within your means" It involves recognizing that there are no "unlimited" resources and that simply because we have the ability to extract natural resources does not mean that it is prudent or wise to do so. With regard to water, sustainability requires us to prioritize our uses making potable, affordable water for

essential human uses a ‘right’ and making water available for conservation a requirement. Mass consumerism, planned obsolescence and being a disposable society are not compatible with sustainability. In order to become a sustainable society, we need to consume less and share more. And we have to learn how to work together toward a common vision or we risk encouraging others to take whatever they can from the common and create non-sustainable conditions for all of us.

Water sustainability is a principle and a challenge that evolves over time, changing in context and intensity with each generation. While some principles, such as restraint and empowerment, are undoubtedly enduring, no generation aspires to, or be able to impose inflexible, unchanging definition of sustainability on future generations. That would be the antithesis of sustainability.

Consider the problem at various scales

A sustainable water population statement should be scalable both in area and time-scale.

Maintain a long-term vision

Sustainability connotes two sides of the same coin, or at least a similar coin. On one side of the coin is the undeniable need to recognize and live within restraints, for our own sake and for the sake of our children and future generations. We cannot squander scarce resources living for today, thereby impoverishing the future. On the other side of the coin is a mandate to empower our children and future generations, providing them with the tools to define their lives in a sustainable manner as they choose to define that.

Focus on our Region for Obtaining Supplies / understand the region's inherent constraints

Let us do what we can with what we have. Knowing that what we have is consumed.

Acknowledge that there are limited resources

While our existing water resources are sufficient for the immediate term we must acknowledge that these current resources are both finite and uncertain. The Colorado River water is oversubscribed, with continued growth, drought, and climate change threatening the carrying capacity of the basin.

With regard to water, sustainability requires us to prioritize our uses, making potable, affordable water for essential human uses a “right” and making water available for conservation a requirement. We need to create policies that consider the regional impacts of water use without ignoring or sacrificing the localized impacts (such as springs drying up or surface waters disappearing).

Follow the "precautionary principle"

A good sustainable water plan adopts the uncertainty principle under conditions where relevant information is difficult to obtain or certainty about data is limited.

Consider needs of human and non-human inhabitants

Sustainability must be informed by and integrated with natural systems. All life, including humans and human societies are embedded in natural systems – the ecological context. Human economies are dependent on natural limits of resource availability and the capacities of ecosystems to absorb wastes and convert them to useful resources. Humanity is reaching the limits of peak extraction of many resources including non-renewable fossil fuels – the energy that powers global civilization. Ecosystem damage is increasing, leading to species extinction and dangerous changes in the climate system.

Use water, not too much, share it with others and the environment.

The environment and others beside us also have a right to use water.

Water sustainability must provide for the rights and needs of both people who do and will live here and of the environment within which we all do and will live.

Recognize and calculate the environmental need for water

I do not believe that we have a sustainable community in our current state.

Technologically intricate and hugely expensive solutions for providing “adequate water” will not make us sustainable if we continue to use more water than is replenished.

Address issues of growth

The triple bottom line approach is the perspective of industry and business. Therefore, it fails to honestly deal with the obvious, but rarely discussed issue of population growth. Increasing population may be good for business in creating a larger consumer base, but population growth also puts an even tighter squeeze on resources.

In the long run, conservation does little more than postpone the inevitable demise of our desert culture if it is coupled to unbridled growth and consumption.

Consider both the value and cost of providing water

Importance of cost and legal considerations in our policies, priorities, and uses.

Planning and Decision Making Principles

Analysis criteria

The foundation for sustainable principles and practices must be holistic, including triple bottom line accounting, diversity, importance of relationships, and integration of parts.

Discover analytic optimization tools, visioning, and scenario exercises that consider rate of consumption, number of consumers, etc.

A good sustainable water plan

- Begins with reviewing the state of the art. Best global practices include integrated resource management combined with 1) science and value-based assessment and

stakeholder processes; 2) legal rights and protections for people and ecosystems; and 3) commitment to sustainability.

- Addresses all major environmental, economic, and social uncertainties.

Present economic, quality-of-life, and other analytically based criteria for consideration

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.

Importance of flexibility or adaptation in managing our supplies.

Importance of unpredictable or unknowable changes in climate that have local and regional effects.

A good sustainable water plan is adaptive to emerging reality and is flexible regarding appropriate configuration and scale of need.

See Appendix _ for hand-out on safe yield criteria from the Upper San Pedro Partnership that may provide a framework for future definitions of goals and planning criteria.

Cost and Economic Analysis

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.

A good sustainable water plan:

- Prioritizes current deficiencies (both capital and deferred maintenance) over new expansion to serve future needs.
- Allocates the infrastructure costs of new growth to new populations.
- Accounts for both water and
- energy costs in the production and delivery of water and conveyance of wastewater.
- Ensures a sustainable balance of all infrastructure needs by determining acceptable costs and choosing affordable solutions.

There are significant costs for our water and wastewater infrastructure looming. Most of the currently identified capital costs are required for securing our full Colorado River water allotment and providing the infrastructure to secure it and deliver it; for upgrading our wastewater treatment facilities to meet new federal and state discharge limits; and for maintaining, upgrading and rehabilitating existing infrastructure. In the not too distant future, when we are acquiring new renewable water sources we are likely to discover that

they will be significantly more expensive than Colorado River water and pumping groundwater.

All alternative water supply techniques (including conservation) should be analyzed and compared using “apples to apples” metrics. For example, What are the total costs of importing new water supplies versus building local rainwater and storm water harvesting infrastructures and systems? We do not have or have not seen these analyses yet.

Decision factors

Monitor, correct, and redirect to ensure efficient, effective, and equitable use of resources.

Regarding our present and future water sustainability, we must distinguish clearly between those decisions that we in Tucson and Pima County can control and those decisions emanating from outside of our region and outside of our direct control. We must be vigilant to what is happening regarding growth and water – in Arizona, especially in Maricopa County and Pinal county; within the Colorado River basin; within the Sun Corridor and the so-called “inland Empire” from Sacramento down through Guaymas; and the national level.

Process characteristics

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.

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.

We all have a stake in achieving Tucson’s and the region’s sustainable water future.

A good sustainable water plan

- Is responsive to all users of water in our region including ecosystem needs.
- Involves peer-review processes to ensure that Plan benefits from proven best practices.

Design a flexible values-based process

Policy Recommendations

Maximize Water Conservation Potential

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.

Land and Water

We really need to face the music regarding growth. In the context of the emerging sustainability crises, there is very little probability that the growth patterns of the past twenty years will repeat. Redevelopment should become more important than new development. Outward sprawl will diminish and new development should increasingly be more compact, resource-efficient, mixed-use, pedestrian-scale, planned communities served by electric transit.

This should result in the development of policy that enables both demand-side and supply-side strategies that continue and improve the quality of life for residents. Factors affecting the rate of growth and where it occurs, such as population trends and environmental issues are important considerations as well.

New sources of water

While Tucson Water is currently at safe yield with respect to the aquifer, the target of safe yield for the Tucson AMA looks in 2020. We must begin now to plan for diversifying our renewable water supplies, to ensure against uncertainties for our current population and to provide for the growth that will come. New water resources must be renewable.

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.

Environmental and cultural senses of place

We need to create policies that consider the regional impacts of water use without ignoring or sacrificing the localized impacts (such as springs drying up or surface water disappearing)

Shared Use of Water Resources and Infrastructure / Regional Cooperation

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.

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.

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.

Regional Economic Development

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.

Regulatory Compliance

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.

Financial Analysis / Pricing

Water should be priced higher to encourage conservative use. The preferred business model should accomplish the goal of reducing per capita water use and be profitable for water providers.

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.

Water subsidies should be granted for valued outcomes including low-income user access, community and backyard food gardens, and restoring eco-systems.

A sustainable water/wastewater system should be designed to meet the regional needs of the existing one million population. Any further public subsidies or infrastructure revenues paid for by current residents should be considered economic development subsidies along with all other economic development possibilities. Decisions regarding economic development subsidies should be based on best projected return on investment as indicated by comparative analyses of total cost/benefits. The costs of any other expansions of public infrastructure and services should be born by the new populations.

Develop / Compare Alternatives

A range of alternatives have been presented for planning our future water supply but not so with wastewater and reclaimed systems. We have been shown an “all or nothing” master plan for a massive centralized wastewater system projected to cost more than \$1billion, the largest single infrastructure project ever proposed in our history. Are there decentralized options for expanding the wastewater system? What is the rationale to scale this project to serve inflated estimates of new people in 2030 when population growth is now slowing? Can the EPA regulatory requirements be met by alternative, more affordable systems, not just the one proposed plan? Can rainwater be harvested, stored and used to flush the conveyance system when needed, thus removing a barrier to wide-scale implementation of grey water systems? Use of grey water reduces the capacity

requirements for potable water currently used for outside irrigation. For the wastewater and reclaimed systems, we also need good “apples to apples” analyses to compare alternatives.

Observations

Humans have a right to Clean, Potable Water

Continued expansion of water use over time, without a clear and honest plan of where the water is coming from is not only foolhardy, it is immoral. The triple bottom line approach has no imperative for the human right to clean potable water. Instead, it contains a nebulous “quality of life” consideration as a part of societal needs.

Things change

The context for planning a sustainable water/wastewater system for metro Tucson’s future is rapidly changing as a consequence both of the economic meltdown and the recent election of a new Administration and Congress. On the one hand, economic growth is significantly slowing almost everywhere and on the other, a new policy priority is emerging which calls for massive investments in infrastructure projects to put people back to work. The question remains what projects would best accomplish the goals of building sustainable public infrastructures and still be affordable under emerging fiscal constraints.

Environment / “Safe Yield Does not Equal Sustainable Yield”

It is important to understand the difference between “safe-yield and “sustainable yield” with regard to groundwater supplies in the arid basins of the southwestern United States. In the Arizona groundwater code, “safe-yield” is defined as a long-term balance between ground water withdrawals and natural and artificial recharge in an Active Management Area (AMA). In other words, the water pumped out of the regional aquifer in an AMA must be balanced, at a minimum, by water that enters the regional aquifer. However, this does not take into account the water needs of groundwater dependent riparian systems, nor the additional negative effects on the social and economic structures of the human community due to ground water pumping. Examples of the latter might include lost tourist revenue due to the loss of riparian areas and thus species dependent upon them, and damage to buildings and infrastructure due to subsidence caused by groundwater pumping in the basin center while recharge only occurs on the perimeter.

...Safe yield does not equal sustainable yield. Why? Because in addition to ground water pumping, the plants that comprise riparian systems also withdraw ground water that is then discharged to the atmosphere (evapotranspiration), plus ground water may also flow out of the basin through the subsurface. Because safe yield rules require that only the water pumped be replaced by recharge rather than the entire amount of water discharged from the ground-water system (i.e., water pumped plus natural withdrawals by plants plus any ground water that naturally discharges from the ground water basin), there is not water left over in the water budget for maintaining or rehabilitating riparian systems. By just meeting safe yield rules, then, any remaining ground water dependent riparian systems in the Tucson AMA will eventually dry up and i.e., and previously lost riparian

areas can never be resurrected. If Tucson Water and Pima County wish to truly achieve sustainable ground water use in the Tucson AMA, it must be agreed that some amount of water beyond simple safe-yield quantities is to be included in the water budget for the maintenance of existing – and the resurrection of lost – ground water dependent riparian systems.

The transition to sustainability is necessary, possible and desirable. Green is important but not sufficient for achieving sustainability. Reducing resource use and pollution is green. Creating, integrating, and maintaining regenerative systems in relationship to nature is sustainable.

Integrate Land and Water Planning

Population in this area will continue to grow, probably significantly. While there are undoubtedly limits to how much this area will grow, those limits are not likely to be reached in our lifetime. Most of the new population is likely to be newcomers rather than our children. Urban form, including where new populations will locate, are equally important, if not more important, to our immediate water sustainability challenges than the population growth numbers.

Miscellaneous

What is the sustainable path forward? Is it about somehow getting back to “normal”? Is it getting our population growth-driven economy “back on track”? Is it merely working more efficiently and effectively as the regional business coalition suggests? But can we have a sustainable water plan if everything else is unsustainable?

The success of any effort toward sustainability will be determined by visible projects, pragmatic policies, and innovative partnerships established to optimize efficiency, effectiveness, and equity.

Sustainability is fundamentally defined by the constancy of effort toward recognized goals established by visionary leaders that have an applied understanding of balance. Recognized leaders, including leaders in their respective fields, should establish the direction of an effort utilizing a vision that identifies what is universally valued by the community. A constant application of effort is then necessary to optimize the effective and efficient use of resources as the goal is pursued. Moreover, any effort should have short-term visible outcomes that support and align with a long-term vision and policies without compromising any individual rights. A balanced approach then recognizes the rights of unrepresented stakeholders such as future residents or the environment. In other words, the sustainability of any fiscally constrained effort will be determined by visible projects, pragmatic policies, and innovative partnerships established to optimize efficiency, effectiveness, and equity.

Using water is a basic right, but only to a certain point. There is a point beyond which we, individually and communally, should not go when using water.