One Water Concepts for Arizona

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President WateReuse AZ

July 27th, 2017
Challenges for optimization of water use

The Triple Bottom Line

1. Economics – life cycle costs

2. Environmental aspects – energy consumption, the “carbon footprint”, water quality, and environmental protection

3. Societal views – public perception
Water Reuse Questions

• Safety of recycled and other non-traditional waters
  • Quality regulated by US EPA and local Dept. Environmental Quality
  • Different water quality classes of recycled water (C, B, B+, A, A+)

• Safety of infrastructure
  • Identified by the color purple
  • Open water conveyance
  • Holding ponds/reservoirs

• Public Perception
  • ‘Yuck’ Factor
  • Prevent Toilet to Tap headlines
  • Education is key

• Is it clean enough?
  • Pharmaceuticals, Personal Care Products, EDC’s, microorganisms etc.
  • Questions remain about accidental ingestion posing health concern for humans
How do we combat these concerns?

- Wastewater Treatment Facilities treat water to extremely high standards
- The majority of recycled water produced considered high quality (A+)
- Regulation and Permitting (ADEQ)
- Non-point source protection (ADEQ)
- Education – *all* water has value
What is One Water?

• Around the country we are seeing examples of integrated and inclusive approaches to water resource management.

• These approaches exemplify the view that all water has value and should be managed in a sustainable, inclusive, integrated way.

• We call this perspective **One Water**.
What is One Water?

• An approach to water planning that aims to:

  “integrate planning and management of water supply, wastewater, and stormwater systems in a way that minimizes the impact on the environment and maximizes the contribution to social and economic vitality” (WERF et al. 2015a).

• Promotes coordination and optimization of water, land, energy, and waste processes
WERF et al. 2015, Key Elements of One Water Paradigm

ONE WATER PARADIGM SHIFT

- Bold Leadership
- Planning and Collaboration
- Culture, Knowledge and Capacity
- Regulation and Legislation
- Citizen and Stakeholder Engagement
- Economics and Finance
Hallmarks of One Water:

• A mindset that *all* water has value
• A focus on achieving multiple benefits
• A systems approach
• Watershed-scale thinking and action
• Right-sized solutions
• Partnerships for progress
• Inclusion and engagement of all
# Stakeholders

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Interest</th>
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<tbody>
<tr>
<td>Wastewater/Reclamation District</td>
<td>Potable &amp; non-potable reuse</td>
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<tr>
<td>Urban Drainage and Flood Control District</td>
<td>Regional stormwater detention basins</td>
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<tr>
<td>Parks and Recreation</td>
<td>Irrigation, onsite rainwater harvesting</td>
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<tr>
<td>Commercial or industrial centers</td>
<td>Sites for graywater/recycled water (reuse); need year-round demand (e.g. sports stadiums, new development, academic campuses, commercial centers, etc.)</td>
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<tr>
<td>Departments of Public Health</td>
<td>Regulatory framework for alternative water sources to protect public health</td>
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<tr>
<td>State Engineer</td>
<td>Legal framework for stormwater capture and rainwater harvesting that protects downstream water rights</td>
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<tr>
<td>Public</td>
<td>Protection of public health and environment, economics/affordability, community development, social justice, etc.</td>
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<tr>
<td>Media</td>
<td>Newsworthy items</td>
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Arenas for Action

1. Reliable and Resilient Water Utilities
2. Thriving Cities
3. Competitive Business and Industry
4. Sustainable Agricultural Systems
5. Social and Economic Inclusion
6. Healthy Waterways
<table>
<thead>
<tr>
<th>Arenas for Action</th>
<th>Strategies</th>
<th>Examples</th>
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<tr>
<td>Sustainable Agricultural Systems</td>
<td>1. Using on-farm strategies to reduce water consumption and manage nutrients</td>
<td>a) Salinas Valley: Recycled Water Saves the Agricultural Sector</td>
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<td>2. Creating partnerships among upstream and downstream communities</td>
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<td>3. Using watershed-scale planning and monitoring</td>
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Salinas Valley Agriculture Use

- Artichokes, lettuce, and strawberries are among the edible crops that are safely and efficiently produced in this region with recycled water.
- Recycled water distributed to 12,000 acres of farmland in Northern Monterey County.
- 60% of water recycled each year.

US Water Alliance, One Water Roadmap, 2016
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<tr>
<td>Healthy Waterways</td>
<td>1. Maximizing natural infrastructure for healthy ecosystems</td>
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<td></td>
<td>2. Managing groundwater for the future</td>
<td>a) Tucson Replenishes Aquifer by Diversifying Supply</td>
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<td></td>
<td>3. Protecting forests to protect water</td>
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<td></td>
<td>4. Utilizing citizen science for ecosystem monitoring and watershed restoration</td>
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Tucson Replenishes Aquifer

• Extensive recycled water system for turf irrigation

• Expanding program for regional riparian habitat restoration

• Sweetwater Wetlands – supports wildlife, students and residents amenity, recharged basins to replenish the local aquifer

• Future restoration of surface flow to boost regional resilience to drought and climate change
What are the key opportunities in Reuse/One Water (tools in the toolbox)?

• Expanding non-potable reuse

• Exploring indirect and direct potable reuse

• On-site reuse (graywater and blackwater)

• Stormwater capture and use/Rainwater harvesting and use

• Aquifer Recharge
Water reuse impacts other planning arenas

Feedback between reuse and other disciplines necessitates an integrated modeling approach to accurately evaluate effects of reuse scenarios on other components of the system.

A. daSilva 2017, Stantec
Example of Collaboration in One Water

Supplies
- Precipitation
- Groundwater
- Surface Water
- Aquifer
- River or Canal

Demands
- Indoor Use
- Outdoor Use
- Non-Consumptive Use
- Consumptive Use
- Waste Water
- Treated Return Flows
- Landscaping

Water Treatment Plant & Distribution

A. daSilva 2017, Stantec
Challenges of One Water

- Economics & Finance
- Legislation & Regulations
- Citizen Engagement
- Culture, Knowledge & Capacity
- Planning & Collaboration
How do we facilitate change and combat concerns while encouraging positive responsiveness in society?
Tools to Implement Change

• Decision-making agencies need to identify and address key factors in their communities that are likely to influence their support.

  • identify what is important to people in their decisions
  • focus engagement programs on the key areas to address.
Risk and Trust

• Factors such as risk perceptions or organizational trust are potentially more receptive to change.

• High correlations between Risk and Trust suggest that if one is able to exert change in people’s risk and trust perceptions, one might also promote change in variables otherwise less receptive to change.
Actions for AZ Communities

Setting the Foundation
• Define your One Water scope
• Identify and convene partners
• Assess needs and opportunities

Establish Direction
• Craft vision and objectives

Developing the Framework
• Establish lasting leadership and institutional structure
• Create framework or plan
• Conduct adaptive planning
• Develop financing strategies

Implement
• Implement the framework

Engaging Stakeholders
Public and Special Interest Groups, Regulators, Elected Officials

Adapted from WRF Project #4660 Blueprint for One Water
Water Resources Planning & Reuse

Erin Young, Water Resources Manager
Utilities Division
ADWR GWAC Recycled Water Subcommittee
July 27, 2017
1. Integrated Master Planning Approach

2. Planning History & Guiding Documents

   • Phase I: Goals & Objectives
   • Phase II: Public Involvement Process

Today’s Talking Points
Utilities Integrated Master Plan

- Guide future water resources & infrastructure management direction
- Supports Goals in Regional Plan
- Integrates Council & Internal Program Goals

Utilities Integrated Master Plan Approach
Water Resource Planning Approach: Find a robust solution(s) to address the broadest range of potential futures.

- Identify a set of scenarios to represent a plausible range of future conditions
- Seek a common near-term strategy that works across the scenarios
- Re-evaluate the scenarios and strategy at decision points

Scenario Planning
1999 – Coconino Plateau Water Advisory Council Water Demand Study
2005 – Council Authorizes Purchase of Red Gap Ranch
2006 – Western Navajo Pipeline & Red Gap Ranch Appraisal Level Studies
2008 – City Red Gap Ranch Pipeline Alignment Feasibility Study
2011 – City Water Resources Master Plan
2012 – City of Flagstaff Resiliency & Preparedness Study
2013 – City Designation of Adequate Water Supply
2014 – Voter-Approved Regional Plan 2030; City Master Plan Water Policies
2015 – City Water System Master Plan; RGR-Leupp Groundwater Flow Model
2016 – City Rate & Capacity Fee Study; Climate Change Scenarios

Planning History & Guiding Documents
Regional Water Planning Studies (1999, 2002)

City’s first Water Resources Master Plan (2011)
  • Population Projection Method (2011)
  • Regional Plan Land Use Method (2011)
  • Regional Plan Land Use Method (2014)

= new demands from 7,700 AF/YR to 16,500 AF/YR

Future Demand Needs
Goals of the Water Resources Section are to
1) Update the 2011 Water Resources Master Plan
2) Incorporate objectives of a "One Water" approach
3) Develop a public involvement plan

Objectives of a “One Water” approach (ex. from Los Angeles)
1) Integrate management of resources and city-wide policies
2) Balance environmental, economic, and societal goals
3) Improve health of local watersheds
4) Improve water supply reliability
5) Implement, monitor and maintain a reliable wastewater system
6) Increase climate resilience
7) Increase community awareness and advocacy for sustainable water

Goals & Objectives
Water Resource Planning

**Step 1. Project Alternatives**
- Stormwater
- Water Conservation
- Reuse
- Local Groundwater
- Red Gap Ranch
- Surface Water

**Step 2. Studies & Analysis**
- Updated Water Resources Master Plan

**Step 3. Community Input & Decision**
- Portfolio A
  - Community
  - Cost
  - Goals
- Portfolio B
  - Community
  - Cost
  - Goals

Timeline:
- 2016
- 2017-2018
- 2019-2020
Water Resource Planning

**Step 1. Project Alternatives**
- Stormwater
- Water Conservation
- Reuse
- Local Groundwater
- Red Gap Ranch
- Surface Water

**Step 2. Studies & Analysis**
- Evaluate Alternatives FY17
- Efficiency Plan FY18
- Financial Analysis

- Evaluate Alternatives
- Program Water Efficiency Plan FY18

Timeline:
- 2016
- 2017-2018
- 2019-2020
Water Resource Planning

Step 1. Project Alternatives

Step 2. Studies & Analysis

- State Law Change for Direct Potable & Indirect Potable Expansion
- Carollo Study to Evaluate Alternatives
- Concept Design: Analysis of IPR & DPR Alternatives FY18

2016 2017-2018 2019-2020
Water Resource Planning

Step 1. Project Alternatives
- Stormwater
- Water Conservation
- Reuse
- Local Groundwater
- Red Gap Ranch
- Surface Water

Step 2. Studies & Analysis
- Groundwater Model
- 100-year Evaluation
- Climate Change Evaluation
- Evaluate Alternatives
- Well Siting Study
- Well Drilling in Capital Improvements Program FY18-FY22

Water Resource Planning

Step 1. Project Alternatives

- Stormwater
- Water Conservation
- Reuse
- Local Groundwater
- Red Gap Ranch
- Surface Water

Step 2. Studies & Analysis

- JACOBS Feasibility/Concept Design Complete 2018
- National Environmental Policy Act (NEPA) Environmental Study FY19*

* Subject to council budget approval
Step 1. Project Alternatives

- Stormwater
- Water Conservation
- Reuse
- Local Groundwater
- Red Gap Ranch
- Surface Water

Step 2. Studies & Analysis

- Evaluate Alternatives
- Economic Analysis
- Financial Analysis

- Upper Lake Mary Watershed Monitoring Project
- Lower Colorado River Basin Navajo-Hopi Water Rights Settlement
  - Infrastructure/Pipeline to Gray Mountain
  - Note: No City dollars invested at this time
- NAMWUA Evaluation of NIA CAP Water Rights

2016 → 2017-2018 → 2019-2020
Water Resources Master Plan Study Components

- Carollo Cost-Benefit Update & Economic Analysis
- JACOBS Red Gap Ranch Feasibility Study & Concept Design
- Water Conservation Efficiency Study
- Advanced Water Treatment Feasibility Study
- Update Water Resources Master Plan
- Public Involvement

Goal: Updated Plan in 2020
"One Water" Approach to Water Management

City Staff, circa 2007

Questions?
Enhanced Aquifer Management Process

To help address the problem of hydrologic disconnect, the concepts of providing incentives for recharge and recovery in same location, and/or disincentives to recover farther from the location of storage were explored.
0% cut to aquifer if recovery within 1 mile of underground storage facility (USF), or inside boundaries of Groundwater Savings Facility (GSF)

10% cut if recovery outside 1 mile of USF or outside boundaries of GSF, but within same sub-basin

20% cut if recovery in different sub-basin than where recharge occurred

ADWR may consider granting greater than 100% credit for water recharged in areas that will uniquely benefit from recharge (e.g. areas of water level declines)

Would apply to future storage/recovery activities; credits currently in place would not be affected
Enhanced Aquifer Management Process

Questions and Comments

- What types of storage to be included
- What types of water to be included
- Which permitted entities to be included
- Needs more specifics and analysis
- Would benefit from stakeholder process
- Concerns about unintended consequences
- Uncertainty about value of credits until recovery
- Concern about ADWR resources to administer program
Use of Stored Water (45-832.01)

- Stored water can only be used or exchanged in the same manner and in the same locations that it was permissible to be used or exchanged before storage
- Stored water may be used annually
- Stored water may be credited to a long-term storage account
Recovery of Stored Water (45-834.01)

- Outside the Area of Impact of Stored Water
  - Within the same AMA
  - Consistent with the management plan and goal
  - With consent if within a service area
  - With consent if outside by within 3 miles of service area

- Within Area of Impact of Stored Water
  - Person recovering is the storer, water is Colorado River water, effluent stored in managed facility/new well within a service area/provider must be notified
  - Recoverer not storer and not Colorado River water, same as outside Area of Impact of Stored Water

NOTE: per Substantive Policy Statement, this recovery area of impact is either a 1 mile “safe-harbor” or a calculated area of hydrologic impact
Consistent with management plan and goal

**Criteria considers both locations – storage and recovery**

1. **Storage either:** contributing to groundwater supplies accessible to current users or committed to AWS determination; component of a remedial action under CERCLA; or determined by director to have contributed to the objectives or achievement of goal

2. **Recovery either:** does not go below the general 100 year depth to static water level for the AMA; or will occur within the service area of a designated provider

3. **Recovery well is:** located in an area with less than 4 feet of decline per year; or component of a remedial action under CERCLA; or determined by director to contribute to the water management objectives of area where located
Recovery of Stored Water (45-834.01)

- A recovery well permit will not be issued for a new well if the recovery will unreasonably increase damage to surrounding land or other water users from the concentration of wells.

- AAC Rule R12-15-1303 states that the director shall determine that a well will cause unreasonably increasing damage if the following apply:
  1. Probable impact of recovery will exceed 10 feet of additional drawdown after the first 5 years of recovery.
  2. Well is located in an area of known land subsidence.
  3. Director determines that the recovery will cause migration of contaminated water from a remedial site.