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Water Efficiency for Environmental and Sustainability Goals: Experience of U.S. Communities

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Community Environmental Goals

- Groundwater protection
- Watershed preservation
- Wastewater quality
- Protecting senstivie species
- Improved stream flows and lake levels
- Riparian and wetlands restoration
- Reduced damage during drought



Role of Water Efficiency in Sustainability

- Living within one's water means
- Resilience--drought, seasonal extremes, precipitation shifts
- Climate change preparedness--too little or too much water
- Reduced carbon emissions
- Water quality effects
- Green infrastructure
- Water security



Community Experience

- Not just the western US
- Metro systems and smaller communities
- Variety of environmental goals
- Water efficiency one part of a solution
- Sustainable communities, energy efficiency, climate change are new drivers

Who Sparks Efficiency Programs

Water supplier or municipality: Operational efficiencies End user programs

Consumers: Directly invest in restoration Increasing concern for sustainability

Regional collaboration: Greater savings Shared costs

Nonprofit or outside group: Sparks or brokers action Focuses on water for environment

State and Federal Contexts

- State water conservation plans
- Climate change planning
- Promoting energy efficiency
- Endangered species requirements (federal)
- State sustainability frameworks



State Sustainability Frameworks

California:

Statewide 20% reduction targets for 2020 State plan identifies climate change impacts and environmental water needs

Oregon:

2012 integrated water resources strategy explicitly addresses instream water needs, watershed restoration and fish protection

Massachusetts:

Water Management Act

2012 sustainable water management framework

Texas:

State plan identifies conservation and reuse as a water source

Community Experience

- Metro Seattle, WA
- San Antonio, TX
- Tampa Bay, FL
- Sonoma County, CA
- Tucson, AZ
- Albuquerque, NM

- Watershed protection, endangered species
- Groundwater protection, flow
- Groundwater and lake levels
- Flow regime
- Restoration
- Endangered species

Community Experience

- New York City, NY
- East San Francisco Bay, CA
- Los Angeles, CA
- Fort Collins, CO
- Metro Boston, MA
- Deschutes River Basin, OR

- Wastewater quality, watershed protection
- Reduced wastewater loads
- Lake levels, safe yield
- Climate change
- More sustainable system
- Watershed sustainability

Metro Seattle, WA: watershed protection

- Environmental Goals: watershed sustainability, instream flows
- Triple bottom line approach to infrastructure investment makes sustainability operational
- Long-term planning results and source water protection of watershed led to long-running water efficiency programs
- Planning incorporates recent analysis of climate change impacts to the Puget Sound area



Metro Seattle, WA: watershed protection

- Programs: city and regional end user programs, rates, green building codes; extensive cooperation with other communities on end user programs
- Results:
 - Reduced long-term water use (24% 1990-2009) with 18% population increase
 - Consistently meets instream flow

Water Sources: 2 watersheds with ESA agreements



San Antonio, TX: endangered species in groundwater

- Environmental Goals: groundwater levels, endangered species
- Plans for 2%/year growth and finite groundwater supply
- Long-term investment in conservation programs, technologies, reuse
- Drought prompted re-thinking of worst-case scenarios
- Voter-adopted water fund to protect areas feeding the aquifer
- Reduced pumping to groundwater trust for other water suppliers



San Antonio, TX: endangered species in groundwater

- Programs: technology, end users, rates, regulation
- Results:
 - Reduced per-capita water use 42% in a high growth area since 1994
 - 1:1.5 cost benefit ratio
 - Stable aquifer levels
- Water Sources: Edwards aquifer (habitat for 14 threatened & endangered species)



Tampa Bay, FL: groundwater and lake levels

- Programs: end users, focus on residential and outdoor water use
- Goals: maintain groundwater levels, reduce surface environmental impacts
- Results:
 - Reduced wellfield pumping by over 50% since 1998
 - ULF toilet program household savings of 10.8-12%
 - Water efficient landscape 2-year savings 5-9%
 - Positive benefit-cost ratio for programs
- Water Sources: groundwater, surface water, desalination; demand management



New York City, NY: wastewater quality

- Planning to protect watershed secures long term water supply
- Long term planning includes no new water sources
- Goals: watershed protection, wastewater quality
- Programs: leak detection, toilet rebate end users
- Results:
 - from 195 gpcd (1991) to 126 gpcd (2009)
 - savings funded infrastructure repair
 - meets wastewater discharge goals
- Water Sources: surface water reservoir



Los Angeles, CA: beyond Mono Lake

- Programs: first residential, now all end users; leak detection, partner with energy utilities
- Goals: originally Mono Lake water levels, reduced water imports, groundwater contamination
- Results:
 - well documented savings for specific programs
 - average water demand like 25-30 years ago, with 1.1 million more people
- Water Sources: demand management as a supply source (16%), surface water, groundwater recharge



East San Francisco Bay, CA: wastewater quality

- Programs: long standing, primarily end users, incentives, partner with energy utilities
- Goals: reduced wastewater loads to Bay
- Results: long term water and dollar savings to utility
- Water Sources: surface water storage



Tucson, AZ: consumers invest in restoration

Program: consumer conservation yields savings for restoration Goals: funds for local riparian restoration Results:

- •3.2 million gallons of water (2011-2013)
- •\$37,000 in donations
- •\$12,000 invested in riparian restoration; \$31,000 in local projects
- •Future savings from scaling up:

850+ ac/ft & \$500,000/year, 12,500 participants

Water Sources: groundwater, groundwater storage, reclaimed water

Sonoma County, CA: outdoor water for flows

- Programs: primarily outdoor water use; regional partnership for other programs
- Goals: Meet state stream flow and water use requirements
- Results: in first year, 24 mgd from process efficiencies, 4000 residential rebates, 340,607 sq feet of turf grass replaced
- Water Sources: Russian River and 2 reservoirs, some local groundwater

Fort Collins, CO: coordination with energy efficiency

- Programs: end users
- Goals: climate change, drought
- Results:
 - efficiency contributed to residential per capita reductions of 25% indoor residential, 44% outdoor, and 37% total water use (1994 to 2012)
 - rebates replaced over 2500 appliances, for 9.7 million gallon savings in 2012

Water Sources: upper Colorado River thru federal water project

Eugene, OR: efficiencies for sustainability

- Triple bottom line includes environmental mitigation
- Goals: Sustainability; reports under the Global Reporting Initiative
- Programs:
 - Links to energy efficiency, sustainability planning, climate change prevention and adaptation
 - Works with watershed agricultural interests to reduce pollution, avoid water treatment costs



Eugene, OR: efficiencies for sustainability

- Results:
 - 2009 conservation investment of over \$155,000 yielded 31.6 million gallons of water savings
 - Long-term improvement in source water stream flow, avoided need for expanded water right application

Metro Boston, MA: more sustainable system

- Goals: reduce water withdrawals to meet long-term safe yield of source watershed
- Programs:
 - Moved beyond water efficiency programs to long-range sustainability
 - Focus on system water efficiencies, operational energy efficiency, renewable power production
- Plan assumes no new water sources
- Most conservative scenario still well under safe yield (record drought and high demand growth)

Climate change impacts greatest on coastal wastewater operations



Metro Boston, MA: sustainability

- Results: 41% long-term reduction despite growth
 - \$350 million avoided costs, \$24 million/year energy savings, reduced carbon intensity of the system
 - reliable, low cost water has attracted businesses to the area
 - has met a state-established river basin safe yield over many years
 - contributes to improved metro area groundwa
- Water Sources: surface water



Deschutes River Basin Conservancy, OR

- Goals: More natural improved stream flow, water quality, water supply for agriculture and 8 communities
- Programs: planning, irrigation water efficiencies, water rights leasing and transfers
- Collaborative board makes decisions by consensus
- Success due to the right folks getting to, and staying at the table
- Has begun ESA habitat conservation plan
- New planning assesses water needs, develops wide range of future scenarios and supply alternatives



Can Water Efficiency Help Meet Environmental Goals?

• Yes, with a clear environmental goal—

volume, season, location of water withdrawal and use

- Yes, to help reduce energy use
- Yes, as part of sustainability or climate change efforts
- Water efficiency may be most helpful as part of a package
- Community may have other reasons to undertake cost-effective conservation investments

Water Efficiency As a Tool to Meet Environmental and Sustainability Needs

- Relate environmental goals to water demand
- Target efficiency programs to demand reduction goals
- Seek out partners in watershed
- Take opportunities when they arise (such as ESA)
- Combine with other management approaches
- Think long-term:

climate change impacts, sustainable water supply



Water Efficiency for Environmental and Sustainability Goals

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Further Reading

- Water Efficiency for Instream Flow--Making the Link In Practice (2011), Alliance for Water Efficiency
- ACEEE report on Exemplary Energy-Water Programs (2012), American Council for an Energy Efficient Economy
- Tackling Water Scarcity: Five Southern CA Water Agencies Lead the Way to a More Sustainable Tomorrow (2013), NRDC
- Arizona Water Meter (2010), Front Range Water Meter (2007), Western Resources Advocates

