

# Water Conservation

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## INTRODUCTION

Worsening drought, population growth, and record wildfire seasons in recent years have called sharp attention to the need to make more efficient use of our water supply. While states and communities in the arid Southwest have understandably led the charge in improving municipal water efficiency through regulations, even cities on the water-rich Great Lakes like Chicago have found themselves exceeding their water allowances and developing efficiency strategies.<sup>1</sup> For municipal water providers, water availability is a three-part equation of water supply (surface and ground plus storage), water treatment capacity, and water distribution capacity. Each part of the equation poses costs and challenges to communities in the form of acquiring adequate water rights and investing and maintaining the treatment and distribution infrastructure. In the next 20 years, the US will add approximately 53 million more people and will have to rise to the challenge of meeting their drinking, bathing, irrigation, and commercial processing needs with a finite supply of fresh water.

This section reviews a range of tools from managing peaks in demand to recycling gray water for irrigation. Models are drawn from a variety of communities across the US including Arizona, California, Minnesota, Florida, and Massachusetts as well as organizations such as US Green Building Council's Leadership in Energy and Environmental Design (LEED) program and the National Association of Home Builders (NAHB) Model Green Home Building Guidelines. The regulations are divided into the following ordinance categories:

- Efficient Landscaping
- Water Use/Waste
- Water Harvesting
- Greywater Recycling

It is worth noting that the vast majority of communities with water conservation ordinances in place couple those regulatory tools with a variety of educational materials and financial incentives to promote additional efficiency. Education campaigns target everything from everyday options for reducing waste to introducing new technologies or practices such as rain gardens or rainwater harvesting. Incentives are often in the form of rebates that facilitate efficiency updates to existing buildings such as rebates for installing water efficient appliances, toilets, faucet aerators, and shower heads as well as in the landscape through such means as turf removal credits and free or discounted rain sensors for irrigation systems. These programs help promote the adoption of new technologies and practices and help improve efficiency of existing development not impacted by many of the regulatory tools. Any community interested in improving water efficiency should consider education and incentive tools in conjunction with regulations as part of their overall strategy.

## IMPLICATIONS OF NOT ADDRESSING THE ISSUE

Failing to establish water conservation provisions at the local level can have significant impacts on the future growth, economy, and food supply of a community. Water is essential to life and as such one can argue that communities will have to improve their performance sooner or later. However, the implications for waiting are costly. Communities that have embraced water conservation measures have enjoyed significant reductions in overall water consumption for both residential and non-residential development.

<sup>1</sup> City of Chicago, Chicago's Water Agenda, 2003, Mayor Richard M. Daley



Southwestern communities, whose long relationship with water conservation measures has allowed for analysis, have enjoyed marked improvements since implementing conservation ordinances. From 1994-2005 Albuquerque, NM, decreased system-wide per capita use from 250 gallons per day to 173g/d while Tucson, AZ, reduced consumption from 169 g/d to 156 g/d. Improvements can also be more immediate. In only three years, the Las Vegas Valley brought their per capita consumption down from 283 g/d to 256 g/d. Reducing demand on the water supply system helps to extend the life of existing infrastructure, eliminate or prolong the need for system capacity upgrades for treatment, distribution, and storage, and enhances a community's ability to deal with a drought.

## GOALS FOR WATER CONSERVATION

The primary goals of the tools discussed in this section are to:

- Reduce community per capita water use while retaining attractive landscapes
- Enable communities to meet future needs of their growing populations
- Protect ground and surface water supplies from unsustainable depletion
- Eliminate unnecessary waste in water use practices
- Reduce wastewater treatment volume and associated municipal expenditures; and
- Promote the increased use of harvested and recycled water for irrigation needs

Special Note :Not all provisions suggested are legal in all states. Colorado law restricts re-use generally for tributary waters-meaning no harvesting barrels.

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## WATER CONSERVATION

### KEY STATISTICS:

- The population of the US is anticipated to increase to 250 million people by 2040
- Ninety percent of all drinking water in the US is pumped from groundwater supplies and most communities have witnessed falling water tables. Water use is exceeding the recharge rate
- Global warming forecasts foresee steadily increasing temperatures worldwide, with more extreme storms, increased drought in some locations and increased flooding in others
- Landscape irrigation accounts for approximately 51 percent of all domestic water consumption in the U.S.
- There is a high level of variability in per capita water consumption between municipalities in comparable climatic zones (e.g., in 2005 the average single-family residential water consumption in Tucson, AZ, was 114 gallons per capita per day compared to 174 in Las Vegas, NV) indicating the potential for more efficient consumption patterns



## WATER USE AND WASTE

		Achievement Levels			References/Commentary	Code Examples/Citations
		Bronze (Good)	Silver (Better)	Gold (Best)		
	Remove Obstacles	<ul style="list-style-type: none"> <li>▪ Identify limiting ordinances (e.g., CC &amp; Rs) that require the use of turf in lawns and common areas and craft exceptions to the limiting ordinances</li> <li>▪ Permit rain gardens, drainage swales, and similar facilities by right</li> </ul>	<ul style="list-style-type: none"> <li>▪ Allow attractive hardscaping alternatives to landscaping requirements (e.g., ornamental gravel, mulch)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Override private covenants and restrictions that require turf grass or limit water-conserving landscaping</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wisconsin Department of Natural Resources, <u><a href="#">Rain Gardens: A how-to manual for homeowners</a></u> (2003)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Las Vegas Valley communities served by Southern Nevada Water Authority including Boulder City, Henderson, North Las Vegas, Clark County, Las Vegas (multiple ordinances)</li> <li>▪ Tucson, AZ (Water Waste and Tampering Ordinance – Ordinance 6096, Plumbing Codes – Ordinance 7178, Emergency Water Conservation – Ordinance 8461), available online at <a href="http://www.ci.tucson.az.us/water/ordinances.htm">http://www.ci.tucson.az.us/water/ordinances.htm</a></li> <li>▪ U.S. Green Building Council, LEED for Neighborhood Rating System (See reduced water use credits, p.101.), available online at <a href="http://www.usgbc.org/ShowFile.aspx?DocumentID=2845">http://www.usgbc.org/ShowFile.aspx?DocumentID=2845</a></li> </ul>
	Create Incentives	<ul style="list-style-type: none"> <li>▪ Grant extra landscaping credit for rain gardens</li> </ul>	<ul style="list-style-type: none"> <li>▪ Accelerate permitting for developments meeting LEED-ND water conservation standards</li> </ul>	<ul style="list-style-type: none"> <li>▪ Give extra landscaping credit for protection of native plants on site</li> <li>▪ Give bonus points in design review systems for water conservation and water harvesting</li> </ul>	<ul style="list-style-type: none"> <li>▪ More information on rain gardens and sample garden plans available online at <a href="http://www.raingardens.org/Index.php">http://www.raingardens.org/Index.php</a></li> </ul>	
	Enact Standards	<ul style="list-style-type: none"> <li>▪ Include optional low-water landscaping or plant list as part of landscaping code</li> </ul>	<ul style="list-style-type: none"> <li>▪ Require all new commercial and multi-family development to use Xeriscape (drought tolerant) principles and low-water plants from established plant list in landscaping</li> </ul>	<ul style="list-style-type: none"> <li>▪ Require use of on-site or municipal recycled /harvested water for non-potable uses</li> </ul>	<ul style="list-style-type: none"> <li>▪ Albuquerque, NM enjoyed a 35% decrease in single-family residential daily per capita water consumption after adopting water-efficient landscaping provisions</li> </ul>	

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**WATER CONSERVATION**


**WATER USE**

		Achievement Levels			References/Commentary	Code Examples/Citations
		Bronze (Good)	Silver (Better)	Gold (Best)		
	Remove Obstacles	<ul style="list-style-type: none"> <li>Update building code to be in full compliance with the US Energy Policy Act of 1992 (EPAAct)</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Las Vegas Valley communities served by Southern Nevada Water Authority including Boulder City, Henderson, North Las Vegas, Clark County, Las Vegas (multiple ordinances)</li> <li>Santa Monica, CA (No Water Waste Ordinance), available online at <a href="http://www.smgov.net/EPD/residents/Water/waste_ordinance.htm">http://www.smgov.net/EPD/residents/Water/waste_ordinance.htm</a></li> <li>San Francisco, CA (Residential Water Conservation Ordinance), available online at <a href="http://www.sfgov.org/site/uploadedfiles/dbi/Key_Information/19_ResidEnergyConsBk1107v5.pdf">http://www.sfgov.org/site/uploadedfiles/dbi/Key_Information/19_ResidEnergyConsBk1107v5.pdf</a></li> <li>Austin, TX, Water Use Management Ordinance, available online at <a href="http://www.ci.austin.tx.us/watercon/waterordinance.htm">http://www.ci.austin.tx.us/watercon/waterordinance.htm</a></li> <li>Flagstaff, AZ <a href="http://www.flagstaff.az.gov/index.asp?nid=104">http://www.flagstaff.az.gov/index.asp?nid=104</a></li> <li>Shrewsbury, MA <a href="http://www.shrewsbury-ma.gov/sewerwater/publicnotice.asp#conservation">http://www.shrewsbury-ma.gov/sewerwater/publicnotice.asp#conservation</a></li> </ul>
	Create Incentives	<ul style="list-style-type: none"> <li>Allow increased density in exchange for reduced water use in multi-family developments</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Large Customer Mandatory Water Conservation Plan – require large water users (e.g., those consuming more than 50,000 gpd) to submit a long-range water conservation plan that addressed both indoor and outdoor water use. Clearly define enforcement methods and associated penalties in the ordinance</li> </ul>	<ul style="list-style-type: none"> <li>Western Resource Advocates, <a href="#">Water in the Urban Southwest</a> (2006)</li> </ul>	
	Enact Standards	<ul style="list-style-type: none"> <li>Prohibit landscape watering between 11 am and 7 pm during hot and dry months (as defined by local temperature and precipitation patterns)</li> </ul>	<ul style="list-style-type: none"> <li>Regulate days of the week watering is allowed (e.g., alternate days by even v. odd street numbers)</li> <li>Restrict watering on steep slopes</li> <li>Require installation of water meters on all new construction or rehabilitation</li> </ul>	<ul style="list-style-type: none"> <li>Regulate water-wasting outdoor activities such as hosing down pavement, buildings, or equipment unless runoff is returned directly to a stormwater drain</li> <li>Regulate wasteful residential irrigation practices such as misdirected spray heads, runoff into driveway or adjacent lots, and broken or leaking sprinklers</li> <li>Require all new and renovated car washes to install water recycling systems</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	

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**WATER CONSERVATION: REDUCE DEMAND ON WATER TREATMENT AND DELIVERY SYSTEMS\***

Rainwater Harvesting and Greywater Recycling	Achievement Levels			References/Commentary	Code Examples/Citations	
	Bronze (Good)	Silver (Better)	Gold (Best)			
	Remove Obstacles	<ul style="list-style-type: none"> <li>Identify limiting regulations and private covenants (e.g., homeowner association CC &amp; Rs) and craft exceptions that include rainwater harvesting tanks</li> <li>Where state water law allows, repeal any ban on the ability of development to have on-site rainwater harvesting systems</li> <li>Work with legislators to update state law where current regulations completely or effectively prohibit greywater recycling. Arizona is commonly regarded as the best example of statewide legislation for greywater recycling</li> </ul>	<ul style="list-style-type: none"> <li>Allow above- and below-ground water storage tanks as a conditional use except in special districts (e.g., historic districts) or locations where water law prohibits on-site retention of rainwater</li> </ul>	<ul style="list-style-type: none"> <li>Allow water storage tanks as a by-right accessory use except in special districts (e.g., historic districts) or locations where water rights law prohibits on-site retention of rainwater</li> </ul>	<ul style="list-style-type: none"> <li>Tucson Water, Water Harvesting Guidance Manual (2005)</li> <li>Texas Water Development Board, The Texas Manual on Rainwater Harvesting (2005)</li> <li>Lighthouse, BC Green Building Code Background Research: Greywater Recycling (2007)</li> <li><a href="http://www.housing.gov.bc.ca/building/green/Lighthouse%20Research%20on%20Greywater%20Recycling%20Oct%2022%2007%20_2_.pdf">http://www.housing.gov.bc.ca/building/green/Lighthouse%20Research%20on%20Greywater%20Recycling%20Oct%2022%2007%20_2_.pdf</a></li> <li>Arizona State law on greywater recycling with further analysis and state-by-state comparative discussion available online at <a href="http://www.oasisdesign.net/greywater/aw/index.htm#arizona">http://www.oasisdesign.net/greywater/aw/index.htm#arizona</a></li> </ul>	<ul style="list-style-type: none"> <li>(FL) Palm Beach County Reclaimed Water Ordinance (Ord. No. 97-12, § 1, 5-20-97) available online at <a href="http://www.municode.com/resouces/gateway.asp?sid=9&amp;pid=10323">http://www.municode.com/resouces/gateway.asp?sid=9&amp;pid=10323</a></li> </ul>
	Create Incentives	<ul style="list-style-type: none"> <li>Reduce/eliminate permit fees for installation of water storage tanks</li> <li>Revise plumbing and building code requirements to allow for greywater recycling systems</li> </ul>	<ul style="list-style-type: none"> <li>Offer credits to residential and commercial developments that install water harvesting systems</li> <li>Eliminate permit requirement for greywater recycling systems for small residential systems</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	
	Enact Standards	<ul style="list-style-type: none"> <li>Create specific screening requirements to apply to this use appropriate to the use context</li> <li>Local jurisdictions can further refine the list of system size and design requirements for different capacity systems and associated standards above those established in applicable state law</li> </ul>	<ul style="list-style-type: none"> <li>Require the installation of recycled water distribution infrastructure in all new development so recycled water use is an option for irrigation</li> <li>Require development design to include water harvesting for landscape irrigation</li> </ul>	<ul style="list-style-type: none"> <li>Require specified percentage of irrigation water in a development to come from grey water or harvested rainwater</li> <li>Require greywater recycling systems.</li> </ul>	<ul style="list-style-type: none"> <li>Florida currently has a water recycling capacity of 1.1 billion gallons/day, over half of its total wastewater treatment capacity</li> <li>Florida Department of Environmental Protection, <a href="#">Florida Water Conservation Initiative</a> (2002)</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>