International Center for Enterprise Preparedness (InterCEP)

Water Scarcity, Quality, and Regulations in the United States

Web Forum

On February 16, 2017, **Edward R. Osann**, Senior Policy Analyst in the Water Program at **Natural Resources Defense Council (NRDC)**, led a discussion about water scarcity and efficiency strategies in the United States. His presentation covered three general topics:

- Areas of the US most affected by water scarcity
- Policies and technologies to improve water efficiency
- Potential for future regulations and voluntary programs

I. Water Scarcity in the United States – Current Conditions

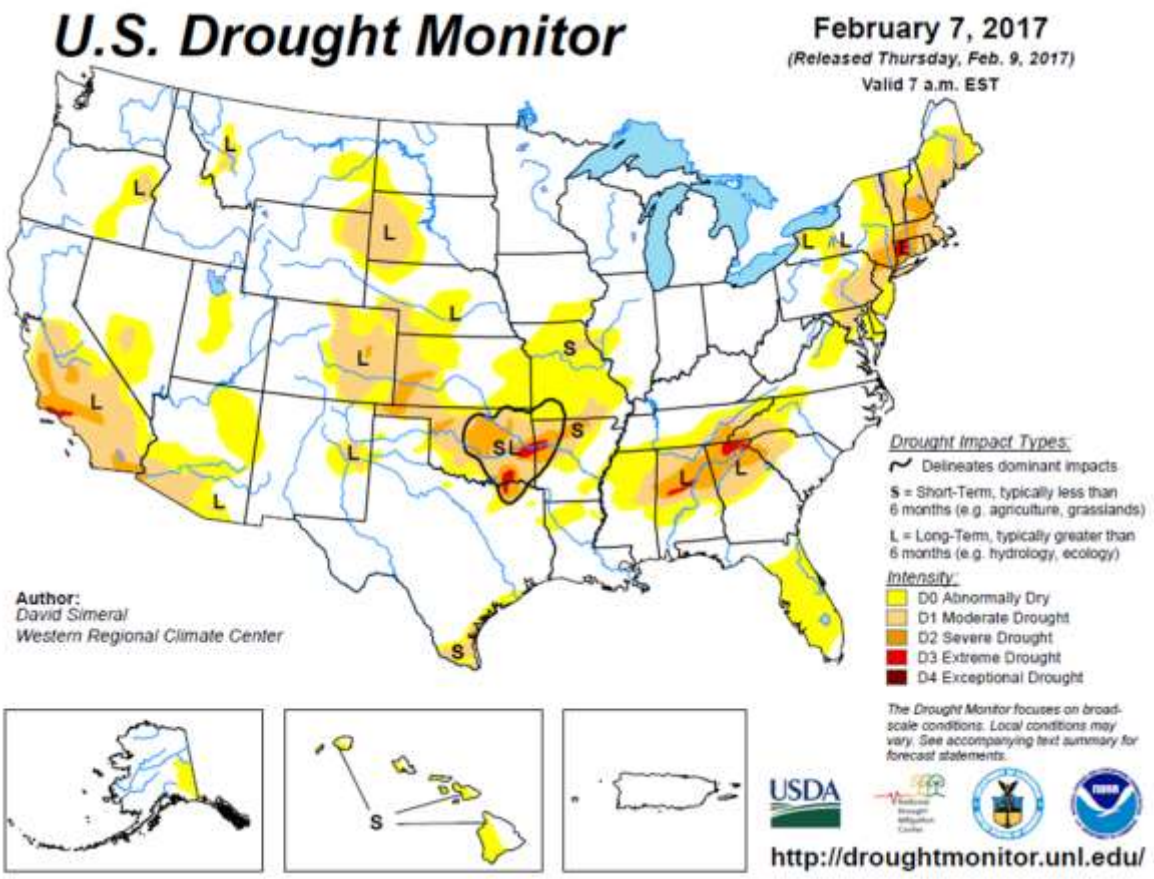
There is lingering drought in the Southwest and in California. Although northern California has received high levels of precipitation, and that has led to problems for infrastructure such as Oroville Dam, Southern California remains in drought condition today.

The Northeast of the US is also experiencing drought conditions. Areas along the Eastern Seaboard are susceptible to periodic drought, as there is a significant amount of population in this part of the country that depends on limited groundwater resources and modest surface water supplies. The Atlanta area is also subject to periodic drought and supply curtailments.

These trends suggests there is an ongoing vulnerability in the water availability for some of the country's most populous geographical areas. The current drought conditions are shown in Figure 1, which includes a map produced by the *National Drought Mitigation Center* that shows drought intensity and drought impact types across the country.

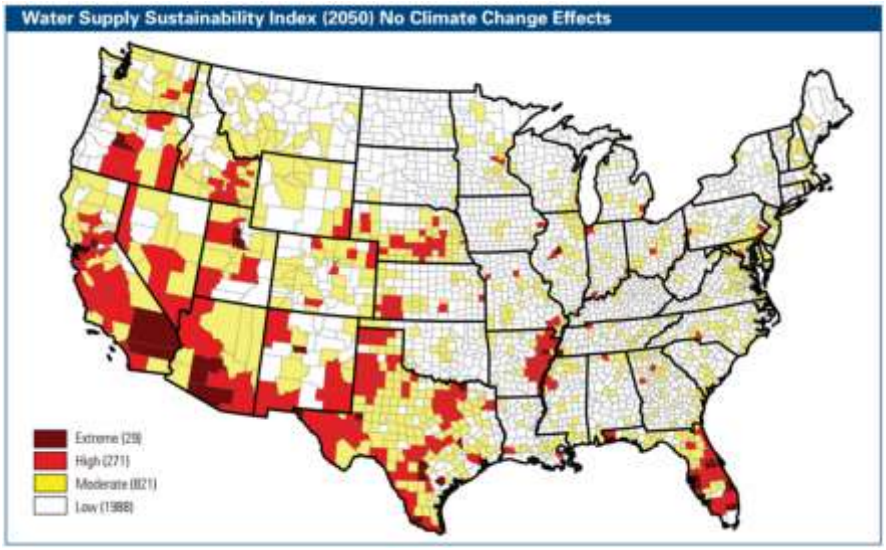
In 2010, the consulting firm Tetra Tech prepared a report for NRDC containing a county-level analysis that projected water supply and demand conditions to 2050. The results are summarized in Figures 2 and 3, and suggest that by the end of this period, Texas, Florida, the Southwest and the Arkansas delta will experience significant water scarcity issues. The analysis then considered the impact of climate change. When this factor is considered, Nebraska, the Dakotas, Oklahoma and Kansas also show significant water scarcity concerns by the middle of the century, as do many of the metropolitan areas of the Northeast and Midwest.

Figure 1. U.S. Drought Monitor



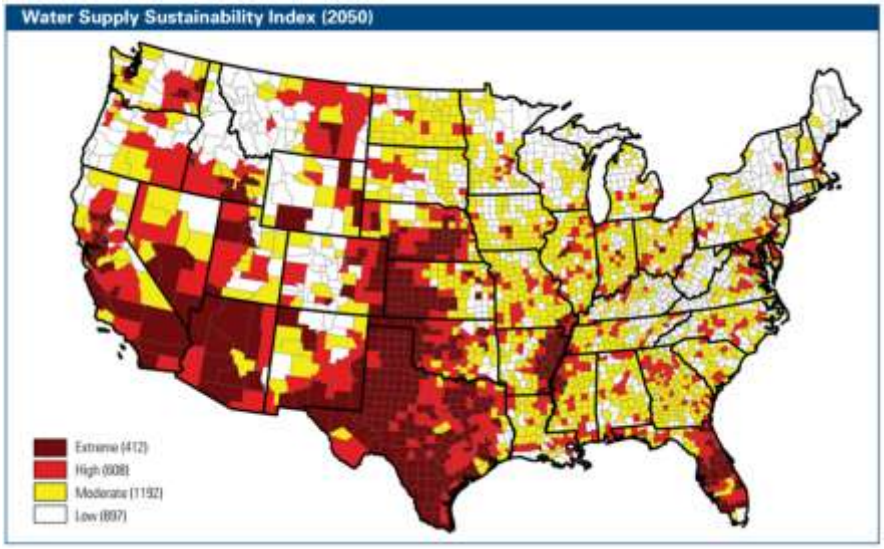
Source: The National Drought Mitigation Center, *U.S. Drought Monitor*, available at: http://droughtmonitor.unl.edu/

Figure 2. Water Supply Sustainability Index in 2050 (with available precipitation corresponding to 20th century conditions, i.e., 1934-2000).



The four categories, Extreme, High, Moderate and Low, reflect the risks to water sustainability, and the number in parenthesis shows the number of counties in each category. Source: S. B. Roy el al. 2010. *Evaluating Sustainability of Projected Water Demands Under Future Climate Change Scenarios*. TetraTech. Available at: http://rd.tetratech.com/climatechange/projects/doc/Tetra_Tech_Climate_Report_2010_lowres.pdf

Figure 3. Water Supply Sustainability Index in 2050 (with available precipitation computed using projected climate change)



The four categories, Extreme, High, Moderate and Low, reflect the risks to water sustainability, and the number in parenthesis shows the number of counties in each category.. Source: S. B. Roy el al. 2010. *Evaluating Sustainability of Projected Water Demands Under Future Climate Change Scenarios*. TetraTech. Available at: http://rd.tetratech.com/climatechange/projects/doc/Tetra_Tech_Climate_Report_2010_lowres.pdf

II. What is Water Efficiency?

Water efficiency refers to a dynamic collection of technologies and policies that lead to beneficial reductions in water use. In the urban sector, water efficiency measures refer to reductions in potable indoor and outdoor water use. These measures also encompass alternative water supplies, including on-site capture and use of greywater and rainwater that have many of the same benefits.

Drinking water is the most expensive water supply, largely due to the costs of potable water treatment and sanitary collection and treatment. These high costs tend to make conservation activities financially attractive. In contrast, irrigation uses much more water than public water systems but it is not treated water, so the same cost drivers, such as energy consumption, do not apply to the same extent. This is also true for the enormous quantities of water used to cool power plants, which is not treated to drinking water standards.

A key aspect of water conservation policies and efforts is rational pricing. It is well known that sensible pricing is closely associated with decreasing trends in water use.

In general, the components of a water efficiency strategy include:

- Rational pricing for both water and wastewater
- Sensible regulations
- Utility investments on behalf of customers
- Research & development

Over the last few decades there has been a broad decline in per household water use. A study that analyzed a 15-year period found a reduction of about 0.5% per year in communities across the country – even those without active water conservation programs. The authors attributed about 2/3 of this decline to more efficient plumbing and water-using appliances[1].

There is a feedback loop between pricing, efficiency and use. The unit costs of water and wastewater have been increasing at about twice the consumer price index (CPI). Although water consumption is relatively inelastic compared to other services, the price elasticity of water is not zero.

Some important *water conservation options* include:

Multi-family sub-metering: Many households in multifamily buildings do not get a water bill, but this is changing and more households are now getting a price signal.

More accurate water meters: Improved meters can capture very low flows that are indicative of leaks and they may prompt consumers to search their premises for leaks in order to reduce waste.

[1] See Rockaway, T.D.; Coomes, P.A.; Rivard, J.; & Kornstein, B., 2011. "Residential Water Use Trends in North America," *Journal - American Water Works Association (AWWA)*, 103:2:76.

High efficiency washers: Clothes washing is still a major use of water, around 20% of indoor water use, and this represents an area where substantial improvement could be made. New standards for washers can significantly reduce the amount of water and energy consumed by these devices. New federal efficiency standards for front-loaders, for example, are expected to result in 43% energy savings and 52% water savings relative to the prior standard.

Utility leak detection: Technology is improving in this area and this should reduce waste in water distribution systems. Management of leaks is the responsibility of suppliers. States are starting to require water utilities be more proactive to report what their water loss profile is and what they are doing about it. Texas, Tennessee, Indiana and Georgia have made a lot of progress in this area. Water losses from utility leaks are very significant. An estimate for California suggests that over 800,000 acre feet of water are lost to leaks in the state every year. NRDC has an interactive map that shows state policies for water loss auditing and reporting and it is available at: https://www.nrdc.org/resources/cutting-our-losses

Pressure-regulating sprinklers and plant palette: Landscape water use is very important. In California, for example, half of all publicly supplied drinking water is used for outdoor landscaping, which is a very significant amount and a discretionary use. Pressure-regulating sprinkler bodies can reduce the overspray and runoff that is commonly generated by automatic sprinkler systems. The plant palette itself is very important as well, since different species of plants require different amounts of water. Labeling of plants where they are sold so consumers know whether they require high, medium or low water can facilitate water conservation.

Pool covers: In many parts of the country, such as the southwest, many households have a pool. Pool covers can play a significant role in reducing the amount of water lost to evaporation, and can be a significant drinking water conservation measure. Pool covers can reduce water loss from the approximately 750,000 swimming pools in Southern California to save about 85,000AF of water.

Other water conservation measures that are becoming more common include: greywater treatment and reuse; rainwater capture and reuse; and storm-water recharge.

III. Potential for Additional Regulations and Voluntary Programs

The United States has had water efficiency and conservation regulations for about 20 years. Given the current political climate it is unlikely that any new regulations will be implemented at the Federal level in the short-term.

Other labeling and voluntary programs have the potential to further reduce water consumption per household. An example is the *Energy Star* label, which includes criteria for clothes washers that encompass energy and water use. The criteria for this label are dynamic and Energy Star is widely recognized by consumers.

Other voluntary labeling programs will also be key drivers for water efficiency improvements over the next 3 to 5 years. The *Residential Energy Services Network (RESNET)* developed the *HERS Index*, a voluntary program that has become the industry standard to measure a home's energy efficiency. This index is widely used and has been found to be very valuable for marketing and regulatory-compliance purposes.

The *WER Index* is intended to be an analogue to the HERS index for water efficiency. The Index is based on a comparison between a rated home and a reference home of comparable size, location and attributes. The reference home has a value of 100 and if the rated home achieves a lower value it means the home performs better from a water conservation/efficiency perspective. Software will allow for key data inputs and for computation of the score. This type of tool has tremendous potential to improve water conservation efforts.

State and local regulations also have the potential to improve water efficiency and conservation. Examples include:

Building and plumbing codes: There have been improvements in water codes in the past and this is likely to continue. There are national model codes and they are revised on a three year basis and considered for adoption by states and localities.

State product efficiency standards: States such as California, Colorado, Texas and Georgia have state efficiency standards for products that use water and plumbing products that are more stringent than Federal standards.

Water waste ordinances, lawn watering days, and landscape water efficiency ordinances: These are also implemented at the local level. For example, many communities have “No Mow” Ordinances and weed and nuisance ordinances that have the potential to incentivize households to allow alternative planting and landscaping instead of traditional mowed turf grass. This can include using turf varieties that are designed not to be mowed and that have substantially lower water use requirements.

Conservation Pricing: Pricing of water in the US is almost entirely local. This contrasts with energy service, which most often comes from state regulated, investor-owned companies. In the case of electric power, about 85-90% of households get it from a state regulated company, with the balance being served by municipal utilities or rural co-ops. That ratio is reversed when it comes to water, which households typically get from a publicly owned water supplier. These rates charged to the customers of these entities are not regulated by state public service commissions. Their pricing structures are the product of local decision-making.

Key Take-Away Points from the Forum:

- Hydrology will change with climate change, leaving historic records less useful predictors of future conditions.

- Water use in the US is declining on a per capita and per household basis, and in many communities is declining in absolute terms.
- The unit costs of water and wastewater service will continue to increase, challenging revenue stability and traditional utility business models and pricing strategies.
- Water efficiency remains a dynamic and constructive strategy for dealing with each of these factors.

Additional Resources:

- Natural Resources Defense Council (NRDC) – Water: https://www.nrdc.org/issues/water
- NRDC - State Policies to Track and Reduce Leakage from Public Water Systems: https://www.nrdc.org/resources/cutting-our-losses
- Residential Energy Services Network (RESNET) - Water Efficiency Rating (WER) Index: http://www.resnet.us/professional/about/resnet_to_develop_water_efficiency_rating_system
- WaterSense – An EPA Partnership Program: https://www3.epa.gov/watersense/