Water Scarcity: Who’s the Gorilla in the Room?

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USDA Outlook
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A Gorilla or Three Big Monkeys?

- Drought
- Population Growth
- Agricultural and Industrial Uses
Texas is actually looking pretty good relative to 2011 …

September 13, 2011

U.S. Drought Monitor
CONUS

(Released Thursday, Sep. 15, 2011)
Valid 7 a.m. EST

February 3, 2015

U.S. Drought Monitor
CONUS

(Released Thursday, Feb. 5, 2015)
Valid 7 a.m. EST

… but parts of Texas are still in an exceptional, multi-year drought …
Will Drought Be More Commonplace?

A ‘megadrought’ will grip U.S. in the coming decades, NASA researchers say

Fading El Niño could extend Texas drought

Southwest, Central Plains Face ‘Unprecedented’ Drought

Climate Forecast: More Southwest Droughts and Australian Floods
Global warming will drive La Niña to greater extremes, a new study says—and El Niño too.

Drought among the worst in Texas in past 500 years
Lubbock, TX, Rainfall (1911 – 2014)

[Diagram showing rainfall data from 1911 to 2014 with notable years and periods labeled: 1917, 1930s, 1950s, 2011, 2012, 2013, with a total rainfall of 18.45 inches marked.]
Texas Reservoir Levels (2015)

Source: Texas Tribune
Texas water supply reservoirs are at 64.9%.
US population growth areas have water scarcity issues...
County Population Growth (2012 – 2013)

Most areas of recent population growth also correspond with areas of oil and gas exploration

Source: US Census Bureau

Legend

<table>
<thead>
<tr>
<th>Percent growth</th>
<th>Primary source</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 or more</td>
<td>Natural increase</td>
</tr>
<tr>
<td>2.0 to 2.9</td>
<td>Net migration</td>
</tr>
<tr>
<td>1.0 to 1.9</td>
<td>Equal</td>
</tr>
<tr>
<td>Up to 0.9</td>
<td>No growth or no primary source</td>
</tr>
</tbody>
</table>
Situation

- Gorilla 1: A big drought in the Southwest
- Gorilla 2: Increased rate of population growth in the aid regions
- What does this mean for water consumers other than people?
  - Gorilla 3: Agriculture and Industry
Agriculture Example Will Focus on One River Basin in Texas
LCRA Rice Irrigation Areas in Texas
People vs. Agriculture?
Texas Rice Farmers Take the Hit; No Water in 2011-15; Likely Cause a Loss of Infrastructure & Community
Energy Industry is a Growing Water User

- Water used for fracking is small, usually about 1% of the state’s water usage
- But, locally water usage could be quite large
  - 2 to 10 million gallons per well
  - Globally 38% of shale oil & gas in water stressed regions
  - In the Texas Eagle Ford Shale water use could amount to 89% of total water use in peak production
  - In the Texas Burnett Shale about 50% of water usage in 2006 was for fracking
- Jan 2001-Sept 2012, 25,450 wells reported using 65.8 billion gallons; the annual water needs for 2.5 million Americans
FIGURE 1: NUMBER & PERCENTAGE OF HYDRAULICALLY FRACTURED WELLS BY WATER STRESS

Source: CERES, Hydraulic Fracturing & Water Stress, May 2013
### Figure 6: Volume of Water Injected for Hydraulic Fracturing by State & Water Stress Regions

<table>
<thead>
<tr>
<th>State</th>
<th>Baseline Water Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>Arid &amp; Low Water Use</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Low (&lt;10%)</td>
</tr>
<tr>
<td>Arkansas</td>
<td>Low to Medium (10-20%)</td>
</tr>
<tr>
<td>Colorado</td>
<td>Medium to High (20-40%)</td>
</tr>
<tr>
<td>Louisiana</td>
<td>High (40-80%)</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Extremely High (&gt;80%)</td>
</tr>
</tbody>
</table>

Source: CERES, Hydraulic Fracturing & Water Stress, May 2013
FIGURE 3: TEXAS—NUMBER OF WELLS BY WATER STRESS

Baseline Water Stress:
- **Low**
- **Low to Medium**
- **Arid & Low Water Use**
- **Medium to High**
- **High**
- **Extremely High**

Texas: number and percentage of wells in varying water stress regions

Source: CERES, Hydraulic Fracturing & Water Stress, May 2013
**Figure 4: Colorado—Number of Wells by Water Stress**

- **Baseline Water Stress:**
  - Low
  - Low to Medium
  - Arid & Low Water Use
  - Medium to High
  - High
  - Extremely High

Colorado: number and percentage of wells in varying water stress regions

Source: CERES, Hydraulic Fracturing & Water Stress, May 2013
Summary

- Drought appears to be with us for many years
  - Continued water scarcity in Southwest and West
- Population continues to grow in water scarce regions
  - Added stress on diminished water supplies
- Agriculture is the first to lose access to water
  - Even if the industry has long standing water rights
  - Puts severe economic pressure on agricultural infrastructure and rural communities
- Energy industry water needs are expanding
  - Water stress regions are using water at increasing rates
  - Majority of water is for energy
  - Where will the trade-off end?
FIGURE 2: NUMBER OF HYDRAULICALLY FRACTURED WELLS BY STATE & WATER STRESS

Source: CERES, Hydraulic Fracturing & Water Stress, May 2013