Water Management Research
Perspective from the Irrigation Association

John Farner
Government and Public Affairs Director
Irrigation Association

The Irrigation Association is the leading membership organization for water management companies and professionals in agriculture, landscape and golf.
**MISSION:** To promote efficient irrigation

**VISION:** To be the recognized authority on irrigation

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**CORE STRATEGIC INITIATIVES**

**ADVOCACY**
- Government Affairs
- Public Affairs
- Standards & Codes

**PROFESSIONAL DEVELOPMENT**
- Education
- Training
- Certification

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**CORE SUPPORT INITIATIVES**
- Membership
- Irrigation Show
Top Issues Facing Irrigated Agriculture

Source: FAO (2010b)
May 12, 2015
(Released Thursday, May 14, 2015)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>49.32</td>
<td>50.68</td>
<td>28.96</td>
<td>14.77</td>
<td>6.00</td>
<td>2.62</td>
</tr>
<tr>
<td>Last Week</td>
<td>50.39</td>
<td>50.61</td>
<td>31.61</td>
<td>17.01</td>
<td>6.17</td>
<td>2.83</td>
</tr>
<tr>
<td>3 Months Age 2015</td>
<td>56.97</td>
<td>44.03</td>
<td>21.31</td>
<td>13.32</td>
<td>7.09</td>
<td>2.73</td>
</tr>
<tr>
<td>Start of Calendar Year 2015</td>
<td>60.44</td>
<td>36.16</td>
<td>23.96</td>
<td>14.14</td>
<td>7.49</td>
<td>2.12</td>
</tr>
<tr>
<td>Start of Water Year 2015</td>
<td>58.88</td>
<td>40.11</td>
<td>25.54</td>
<td>15.59</td>
<td>7.86</td>
<td>3.22</td>
</tr>
<tr>
<td>One Year Age 2015</td>
<td>59.23</td>
<td>41.27</td>
<td>31.81</td>
<td>23.42</td>
<td>11.69</td>
<td>3.73</td>
</tr>
</tbody>
</table>

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statement.

Author:
Mark Svoboda
National Drought Mitigation Center

http://droughtmonitor.unl.edu/
Key Geographic Areas
Ogallala Aquifer
Table 3. Change in water in storage in the High Plains aquifer, predevelopment to 2011 and 2009–11, by State and as an overall total, and by comparable methods from this report and previous reports.

[Positive values for increases in water in storage; negative values for decreases in water in storage; accumulated totals by State may differ from aquifer totals because of rounding]

<table>
<thead>
<tr>
<th>State</th>
<th>Change in water in storage, in million acre-feet</th>
<th>2009–11</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Final values calculated for this report, with area-weighted, average specific yield of the aquifer (15.1 percent)</td>
<td>Predevelopment to 2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Predevelopment to 2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculated using methods from previous reports¹</td>
</tr>
<tr>
<td>Colorado</td>
<td>-16.9</td>
<td>-14.8</td>
</tr>
<tr>
<td>Kansas</td>
<td>-62.4</td>
<td>-58.2</td>
</tr>
<tr>
<td>Nebraska</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>New Mexico</td>
<td>-8.7</td>
<td>-8.2</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>-9.4</td>
<td>-7.5</td>
</tr>
<tr>
<td>South Dakota</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Texas</td>
<td>-149.7</td>
<td>-136.5</td>
</tr>
<tr>
<td>Wyoming</td>
<td>-0.4</td>
<td>-0.7</td>
</tr>
<tr>
<td>High Plains aquifer</td>
<td>-246.2</td>
<td>-224.6</td>
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Colorado River Basin

Bureau of Reclamation Study Released in June 2013.

The Study confirmed that the Colorado River Basin faces a range of potential future imbalances between supply and demand. Addressing such imbalances will require diligent planning and cannot be resolved through any single approach or option.
Historical Supply and Use and Projected Future Colorado River Basin Water Supply and Demand

Historical Supply and Use

Water Supply
(10-year Running Average)

Water Use
(10-year Running Average)

Projected Future Supply and Demand

Projected Water Demand

Projected Water Supply
(10-year Running Average)
Research Needs and Potential Partnerships with Irrigation Industry
IA Developed Research Priorities in 2005 – Joint with ARS Input

- Irrigation Water Management Practices & Systems
- Wastewater Utilization on Irrigated Land
- Irrigation Standards & Evaluation Guidelines
- Irrigation Sensors, Controls & Information Technologies
- Irrigation System Manufacturing & Recycling
**Irrigation Water Management Practices & Systems**

**Objective:** Develop more efficient and economic agriculture irrigation practices and systems that conserve natural resources, increase crop yield and quality, and benefit the environment.

Research priorities include:

- Increasing the efficiency of agriculture irrigation.
- Quantifying the effects of wind on sprinkler irrigation patterns.
- Improving irrigation system energy efficiency.
- Compiling databases for soil conditions, water supplies, crop water requirements and climate conditions.
- Capturing crop-specific water requirements.
- Determining irrigation system potential to control crop temperature.
- Defining irrigation best practices for humid areas.
- Improving techniques to manage salinity.
- Reusing and recycling drainage waters.
- Measuring the impact of agriculture irrigation on water quality.
- Documenting the ecosystem benefits of agricultural irrigation.
Wastewater Utilization on Irrigated Land

**Objective:** Develop irrigation technologies that use biological and chemical waste and wastewater while protecting water quality and the environment, preserving natural resources and reducing total cost.

Research priorities include:

- Identifying best practices for rural, residential, municipal, food processing and industrial waste disposal.
- Determining best practices for applying solid and liquid animal waste.
- Managing aesthetic and health considerations of wastewater utilization.
- Investigating the positive impact of agriculture irrigation on air and water pollution.
- Improving nutrient management.
Irrigation Standards & Evaluation Guidelines

**Objective**: Develop standards and evaluation guidelines to improve performance, operator safety and irrigation system management.

Research priorities include:

- Determining criteria for evaluating water application uniformity.
- Optimizing chemical application.
- Developing product standards that meet ANSI, ISO and European Community requirements.
- Specifying system design requirements to ensure operator safety.
- Defining equipment safety requirements for irrigation system design.
- Clarifying short- and long-term system performance requirements.
- Improving irrigation system evaluation based on seasonal versus single-event metrics.
- Developing criteria to evaluate total system areas rather than inappropriate subsets.
- Setting standards for material suitability, and chemical interactions and concentrations.
- Improving system component interchangeability.
Objective: Promote adoption of new technologies for irrigation scheduling, system control and operation, and precision application.

Research priorities include:

- Applying field and remote sensors.
- Implementing information technologies.
- Enhancing automated control systems.
- Developing cost-effective communication systems for data exchange.
- Implementing geographic information systems for differential control of water and chemical application.
- Using global positioning systems to provide input for geographic information systems.
- Developing databases with soil, water supply, crop water requirement and climate condition information for precision irrigation.
Irrigation System Manufacturing & Recycling

Objective: Develop efficient, economic and environmentally responsible manufacturing, recovery and recycling techniques for irrigation systems and components.

Research priorities include:
• Defining appropriate component materials, and recycling and disposal techniques.
• Improving product design, manufacturing processes and product obsolescence to minimize environmental impact.
Looking ahead at research...
Use of unmanned areal systems in irrigation management.
Water-Energy-Food Nexus

- Embedded energy in irrigation water, which then becomes part of the water (energy) footprint of food.

- Irrigation efficiency = Energy efficiency?
Irrigation Association

Action Fields

Society
Accelerating access, integrating the bottom of the pyramid

Economy
Creating more with less

Environment
Investing to sustain ecosystem services

Finance

Governance
Enabling factors/incentives

Innovation

To promote:
Water/energy/food security for all
Equitable & sustainable growth
Resilient, productive environment

Available water resources

Nexus perspective

Energy security

Water supply security

Food security

Urbanisation
Population growth
Climate change
Global trends
Groundwater Recharge

Effects on groundwater recharge due to increases in efficient irrigation.

Yield Productivity

Tying yield productivity into the equation of water savings.
Oxygen.
Food.
Life.

Just add water.

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