Research Needs 2022

Cultivating Agriculture Water Resiliency in Utah

The Challenge and Need

Acute droughts such as what we experienced in 2021 and 2022 are a significant threat to the viability of our farms and ranches. Utah agriculture is facing relentless pressure from growth that is transforming agricultural lands and increasing demands on a limited water supply. Long-term climate trends have decreased and will likely continue to decrease the available water supply. Immediate action that optimizes the use and management of our finite water supplies is needed to both preserve agriculture and sustain the desired growth in Utah for future generations.

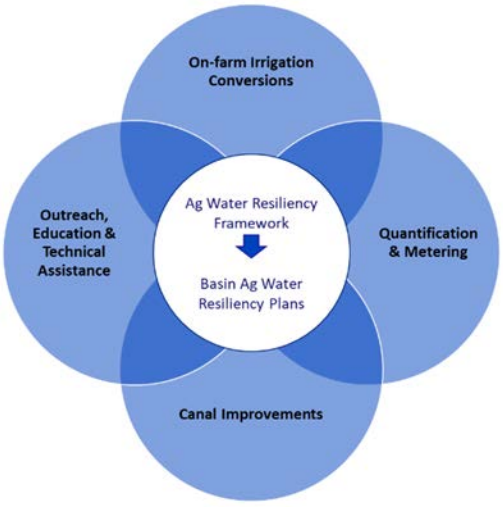
The Goal – Complete the Research Required to Enable Action

To Develop and implement an agricultural water resiliency plan for Utah that accomplishes the following objectives:

1. Preserve agriculture and enable smart growth in Utah for future generations
    a. Preserve Utah's agricultural economy
    b. Increase local use of Utah agricultural products
    c. Adapt agricultural market to products that consume less water
    d. Promote smart growth; protect critical agricultural lands
2. Boost the resilience of Utah's agriculture by enhancing its ability to anticipate, respond, and succeed in spite of drought and other impacts of climate change
    a. Quantification – Provide water users and water managers with the data (for example via metering) they need to optimize their operation and increase water use accountability/transparency
    b. Markets – Evaluate and implement opportunities to optimize the agricultural markets such that less water is required
    c. Tools – Reduce agricultural water diversions and consumption through improved infrastructure and methods
    d. Education – Increase agricultural irrigation outreach, technical assistance, education and demonstration projects
3. Expand the capacity of agriculture to adapt to increasing demands upon a decreasing water supply
    a. Preserve an adequate water supply to maintain Utah's agricultural economy
    b. Protect non-consumptive system uses of water
    c. Develop basin integrated plans
    d. Avoid regulatory curtailments through voluntary efficiency measures that maintain agricultural production

Four Focus Areas

The Agricultural Water Optimization Task Force recommends four areas of focus to initiate a bold vision for agriculture water resiliency in Utah, lay the foundation for a Utah Agriculture Water Resiliency Plan, and represent a critical down payment on the future of Utah. The 2022 Utah Legislature generously allocated $70M toward implementation of these strategies.



The Task Force has identified research needs directly linked to its three objectives and that encompass the four focus areas:

Research Area No.1: Preserving and Enhancing Utah Agriculture

Education

1. Communicate the Value of Agriculture in Utah

a. Goal: Enable the public to grasp the importance of this segment of the economy in their lives and to understand that reducing agricultural water use is not a trivial matter.
b. Question: What is the value of agriculture? Why should its preservation be a priority?
c. How: Partner with other organizations to develop and implement an education/marketing campaign.

2. Discover Local Food

a. Goal: To enhance food security and increase the value of and thereby preserve and enhance Utah agriculture.
b. Question: How can Utah-grown products be marketed to increase consumption?
c. How: Partner with other organizations to develop and implement an education/marketing campaign.

Economics of Water

3. Economic Impact of Agricultural Water Use

a. Goal: Understand the benefits and impacts that are derived by the consumer, community, the State, and the environment that depend upon agricultural water use.
b. Question: What is the economic and social value of water consumed by agriculture to the consumer, community, the State, and the environment? What are the impacts if agricultural water consumption is reduced?
c. How: Review 1) the history of agricultural water use in Utah, 2) the socioeconomic drivers, barriers, and values that have incentivized current practices, 3) economic implications of changed water use and decision making, 4) the costs of water management, 5) irrigation, agricultural, community and environmental benefits, and 6) how that translates into the value of water. Make recommendations that can inform policy changes that maximize benefits and likelihood of success.

4. Develop a "Water Footprint" Calculator

a. Goal: Help a consumer better understand the value of and their dependence upon the water used in in all the products and services they rely upon, including agriculture.
b. Question: How much water does a consumer indirectly consume every day through all the products and services they rely upon? How much of Utah's water is consumed within the state or exported outside of the state via the products and services they utilize or sell outside the state? How much water is imported into the state via the products and services they utilize or provide?
c. How: Develop a calculator that translates the products that a consumer relies upon into an estimate of the quantity of water required to produce those products.

Crop Alternatives

5. Evaluate Alternative Crops that Consume Less Water

a. Goal: Identify and demonstrate crops that producers could switch to that require less water and can maintain the viability of their operations.
b. Question: What alternative crops are more drought resistant, have reduced consumptive use, and provide equal or higher value and can be grown in Utah? Are they economically viable?

c. How: Complete a literature review of options and make recommendations for trial. Develop and implement field demonstrations of the alternative crops.

6. Optimize the Agricultural Value Chain in Utah to Reduce Consumptive Use of Water

a. Goal: Identify opportunities to change crops, products, and processing and marketing of those crops and products that could reduce agricultural water consumption in Utah.
b. Question: Can Utah's economy be optimized to incentivize crops, products, and agricultural value chain that consume less water? What factors are limiting market forces from incentivizing those changes?
c. How: Evaluate the current value chain and what is influencing current cropping, processing and marketing agricultural products. Identify less consumptive products. Develop recommendations for incentivizing renovation and innovation in the market. Evaluate potential consequences to consumers, communities and the environment in Utah.

Research Area No. 2: Planning for a Resilient Water Supply

Policy

7. Water Rights

a. Goal: Provide clarity in the intent and means for managing water rights.
b. Questions:
- What are the potential water rights implications if agricultural water optimization is implemented by a water user?
- How is duty defined for M&I and agriculture?
- Is reduced consumptive use subject to forfeiture? Note that this is perceived as perhaps the most significant "barrier" toward agricultural water optimization.
- Clearly define terms (depletion, consumptive use, water conservation, water optimization, demand management)

c. How: Review questions with the Division of Water Rights and with the Utah Water Task Force as needed. Form work group to study the questions if appropriate.

8. Depletion Accounting

a. Goal: Evaluate options, benefits and impacts for depletion accounting based water rights.
b. Questions:
- How can depletion accounting be implemented for water rights? What are the technical and legal challenges?
- What are the implications of implementing depletion accounting at the basin scale?
- How can conserved consumptive use be measured and tracked?
- What happens to conserved consumptive use water?
- How can and will water users be compensated for reduced consumptive use?
- How can we account for reduced consumptive use and shepherd it to its intended downstream use?

c. How: Review questions with the Division of Water Rights and with the Executive Water Task Force as needed. Form work group to study the questions if appropriate.

Planning

9. Water Metrics

a. Goal: Measure and document the performance and benefits from investments in agricultural water optimization and thereby incentivize investments.

b. Question: What metric(s) could be used to measure progress and enable optimization of water productivity, i.e., the beneficial output or agricultural yield per unit of water consumed? How do we track and define success?
c. How: Review the literature to identify metrics that meet the goals of agricultural water optimization and can be readily implemented in Utah. Develop a metric(s) to track and determine successful water optimization

10. Environmental Benefits & Consequences of Agricultural Water Optimization

a. Goal: Develop a manual of practice that can be used to help evaluate new projects and communicate with the environmental community
b. Question: What are the environmental benefits and consequences from implementation of agricultural water optimization? What are the implications of optimization actions?
c. How: Review and summarize lessons learned from the literature.

11. Develop a Framework for Basin-scale Ag Water Resilience Plans

a. Goals: Engage stakeholders and enable water users to make voluntary changes. Provide a framework for individual plans that will identify and prioritize investments from a local perspective. Incentivize water users and water managers to innovate to minimize risks and maximize benefits. Minimize the risk of change by structuring improvements to be flexible and temporary until they are validated. Develop the means to adapt plan elements to maximize benefits to the water user and basins.
b. Question: What guidance should be provided for basins to develop their own ag water resilience plans and then for the state to integrate the results into a prioritized list of needs and recommendations?
c. How:
    - Define terms (optimization, consumptive use, water conservation, depletion, demand management, regenerative ag)
    - Define statewide goals for water optimization
    - Develop list of potential local purposes/needs for water optimization
    - Develop list of potential local goals for water optimization and identify tools applicable for each
    - Identify agency roles, resources
    - Develop the means to coordinate stakeholders at the local basin level, e.g., watershed councils.
    - Identify potential (and scalable) methods/tools for evaluating water supply, water demands, quantification, and recommendations (methods, physical and organizational infrastructure)
    - Identify potential metrics for evaluating need, prioritizing investments, and measuring success
    - Identify the means for planning investments in quantification
    - Identify the means for investing in outreach and technical assistance
    - Identify the means for planning investments in infrastructure (including funding requirements and options)
    - Develop guidance for preparation of the plan, such as schedule, budget, funding, etc.

12. Basin Ag Water Budgets

a. Goal: Evaluate the opportunities and benefits of implementing agricultural water optimization at the basin scale. Results will inform quantification strategies as well as development of basin-scale ag water resilience plans.
b. Questions:
    - How much water is being diverted and consumed vs. natural flows and depletions?
    - How much could consumptive use be reduced by implementing on-farm measures at the farm and basin scale? How much would it cost? What are the implications at the farm, community, and basin scale?
    - How much could consumptive use be reduced by lining or enclosing canals and ditches at the farm and basin level? How much would it cost? What are the implications at the farm, community, and basic scale?

c. How: Develop basin ag water resilience plans that follow the state framework, develop basin water budgets, and provide prioritized recommendations for implementation.

13. Seasonal Fallowing

a. Goal: Investigate the viability of seasonal fallowing as a successful means to meet the goals of agricultural water optimization.
b. Question: Is seasonal fallowing a viable option for agricultural water optimization in Utah? How do we define fallowing? How does it compare against other means for reducing consumptive use? How has fallowing been previously implemented in Utah? By others? What are the pros and cons, eg, impacts to the field, farm, community and economy? How could it be implemented well in Utah if a reduction in consumptive use is needed? What compensation or incentives could make it viable?
c. How: Review the literature and implementation of seasonal fallowing in Utah to provide guidance for future implementation in Utah.

Research Area No. 3: Implementation

14. Education

a. Goal: Make it easier for water users to access information that will enable them to learn and discover the reasons for and the means to benefit from agricultural water optimization.
b. Question: How can we better disseminate information describing recommended practices, their benefits, costs, and implementation for agricultural water optimization to water users across Utah? What is the value of agricultural water optimization to water users? What are the options, costs, and potential funding sources for on-farm agricultural water optimization?
c. How: Create fact sheets. Increase access to workshops, listening sessions, and networking opportunities.

15. Quantification

a. Goal: To improve, expand, and maintain a water measurement network that delivers accurate and transparent data and builds trust and confidence in our actions. Results will inform preparation of basin-scale water budgets and ag water resilience plans.
b. Question: How can we quantify the water that is used in agriculture to enable better management of it?
c. How: Prepare a plan, identify funding and then develop protocol for collecting and reporting flow measurements, a portal and database for flow measurement data, and a dashboard for accessing, viewing and interpreting the data.

16. Farm Irrigation Consultation/Technical Assistance

a. Goal: Work directly with water users to identify the best ag water optimization options that meet their goals.
b. Questions: How can water users be helped to identify:
    - Existing losses in irrigation system and the methods to fix them
    - Options to modernize and improve irrigation systems
    - Measures to quantify and monitor irrigation system performance and improve operation
    - Options to improve irrigation scheduling
    - Options to make flow, crop condition, and water consumption data easily available
    - How to interpret the available data – how can the data be used?
    - How to integrate irrigation data with agronomic data
    - Potential risks for changing practices and how those risks can be mitigated
    - Potential costs and funding sources for implementation of these improvements
c. How: Work with USU Extension and UDAF to develop and fund an irrigation technical assistance program.

17. Irrigation Company Consultation/Technical Assistance

a. Goal: Work directly with irrigation companies to identify the best ag water optimization options that meet their goals.
b. Questions: How can irrigation companies be assisted to evaluate and improve how their system water budget is monitored, identify system problems and needs, find funding to implement better infrastructure and/or practices, and provide recommendations for improvement?
c. How: Work with USU Extension, UDAF, and basin water districts to develop and fund a technical assistance program.

18. Field Trials of Improvements to Irrigation Methods

a. Goal: Complete field trials to evaluate and demonstrate the benefits of new agricultural water optimization practices.
b. Questions:
    - How can irrigation scheduling be improved? Implemented?
    - Further validation of new irrigation and soil management technologies for reducing consumptive use and maintaining crop yields
    - What are the implications of seasonal fallowing to a field?
c. How: Work with USU Extension to conduct field trials.

19. Conveyance System Improvements

a. Goal: Improve consumptive use estimates from water conveyance systems and determine ideal ways to optimize conveyance system management and water optimization.
b. Questions:
    - Which canals/open ditches are ideal for lining and piping, and which are better suited to remain open?
    - What are the statewide costs associated with widespread lining/piping?
    - What rapid and affordable options exist for quantifying water consumption in conveyance systems?
    - What is the cost of water shepherding through conveyance systems?
c. How:
    - Conduct study to compare the accuracy and cost of water consumption measurement methods in conveyance systems and surrounding land that is supported by the systems.
    - Assess and quantify the cost and implications of lining or piping all major canal and conveyance systems in Utah.
    - Conduct study to determine the cost of water shepherding from a farm through an entire conveyance system.

20. Funding

a. Goal: Identify the means for sustainable and continued investment in agricultural water optimization practices in Utah. Results will inform ongoing implementation of improvements and preparation of basin-scale ag water resilience plans.
b. Question:
    - How much will it cost for a water user to implement agricultural water optimization practices?
    - What level of investment is needed for agricultural water optimization in each basin?
    - What sources of funding are currently available for implementation of and continued operation of agricultural water optimization practices and infrastructure?
    - What alternatives exist to provide a sustainable funding source for these improvements?
c. How:
    - Coordinate with development of basin-scale ag water resilience plans to summarize the potential costs for different agricultural water optimization practices and basin-specific investment needs.

- Summarize available grant and funding sources in a new agricultural water optimization funding guide.
- Evaluate alternative funding mechanisms and make recommendations to the Task Force for future implementation.