Colorado State University Water Programs

Reagan Waskom
Colorado Water Institute
Colorado State University
Colorado Water Trouble Spots

- Front Range growth and declining Denver Basin Aquifer
- Colorado River structural deficit
- Ogallala Aquifer decline
- San Luis Valley groundwater over-appropriation
- S. Platte groundwater wells
- Energy production needs
- Water for endangered species, environmental and recreation flows
- Drought, climate change and forest health
Colorado’s Current Water Diversions by Sector

- Agricultural: 89%
- Municipal and Industrial: 9%
- Self-Supplied Industrial: 2%
Colorado Agricultural Lands
Colorado Population, Irrigated Acres, and River Flows

**WEST SLOPE**
- Population: 562,000
- Irrigated Acres: 918,000

**EAST SLOPE**
- Population: 4,490,000
- Irrigated Acres: 2,548,000

River Flows:
- Colorado (4,500,000 AFY)
- Yampa (1,530,000 AFY)
- White (560,000 AFY)
- Gunnison (510,000 AFY)
- Dolores (510,000 AFY)
- South Platte (320,000 AFY)
- North Platte (110,000 AFY)
- Laramie (100,000 AFY)
- Arkansas (164,000 AFY)

Map showing the distribution of population and irrigated acres across different river systems in Colorado.
Groundwater in Colorado

- 85% used for agriculture on > 2 million acres
- 18% of population relies on groundwater for domestic use
- Groundwater represents about 15% of all water diverted in CO
- CO Division of Water Resources issues several thousand well permits each year (70% for domestic use)
By 2050, Colorado’s Population is Expected to Nearly Double
Statewide M&I Gap Summary

- Existing Supply
- 2050 Identified Projects and Processes

Acre-Feet/Year

- Passive Conservation
  - 150,000
  - 390,000
- 1,161,000
- 350,000

2008 2010 2020 2030 2040 2050
Future Challenge for Colorado: Water Supplies are not necessarily where/when demands are, with 10 million Coloradans by 2050!

- Colorado’s water supply is highly variable and fully appropriated, with the debatable exception of the CO River
- Highly over-appropriated areas of South Platte, High Plains, Denver Basin, SLV and Arkansas
- How do we accommodate growth, industry, energy, food production, environment?
The path to a secure water future.

- Vibrant & sustainable cities
- Healthy watersheds & environment
- Robust recreation & tourism
- Viable & productive agriculture
May 2013 Governor’s Executive Order Directed CWCB to Develop a Plan That:

- Reflects Colorado's values
- Utilizes the work of the IBCC and Basin Roundtables
- Aligns projects, studies, funding
- Allows for more efficient project permitting
The Basin Roundtables and Colorado’s Water Plan

• Each Basin Roundtable drafted a Basin Implementation Plan to address the water supply gaps identified in SWSI 2010 on a local level.

• The draft BIPs were delivered to the CWCB in July, 2014.

• Elements of the BIPs comprise a significant portion of Colorado’s Water Plan.

• Final plan was delivered to the Governor on Nov. 19, 2015.

www.coloradowaterplan.com
COLORADO'S WATER PLAN

- CRWAS
- Drought Mitigation Plan
- SWSI
- Climate Change Report
- Water Quality & Permitting
- IBCC Work
- Underground Water Storage Study
- Basin Implementation Plans
- CDSSs
Providing an adequate water supply will involve implementing a mix of low-risk strategies.
Conservation

- Municipal & industrial conservation
- Reuse
- Land use
- Agricultural conservation, efficiency, & reuse
- Self-supplied industrial
- State agency conservation
- Education and outreach
CWP Action Plan – all have an Ag component

- **Buy & Dry**
- **Alternative Ag Transfers**
- **New Supply**
- **Conservation**
- **Nonconsumptive**
- **IPP**
- **Storage**

- Minimize Transfer of Irrigated Acres
- Implement agricultural and Ag sharing projects
- Planning and Preserving Options
- Low/Medium Conservation Strategies
- Implement non-consumptive projects that still preserve options
- 80% IPP Yield Success
- Multiple Purpose In appropriate site
Alternatives to Buy and Dry

• Rotational Fallowing
• Interruptible Supply
• Deficit Irrigation
• Water Coop

• Water Bank
• Water Conservation Easement
• HB 13-1248
• Flex water market
Water Resources

- Teaching
- Research
- Outreach
“Water is the most valuable resource on the planet, and Colorado State University is a bridge – providing research expertise and outreach that span nearly all areas of global water concern.”

Dr. Tony Frank
14th President of Colorado State University
CSU’s History in Water Research, Education and Outreach

- 125 year history in water-focused work
- CSU-trained water experts in over 100 countries on every continent
- Pioneer in water engineering, hydrology, irrigation technologies, watershed protection, and water resources management
- First university in the world to host one of the U.N.’s “decade” announcements—U.N.’s Decade for Deserts and the Fight against Desertification
- Home to the Colorado Water Institute
CSU Water Programs Today

- Approximately 160 faculty and research scientists across all 8 Colleges in 25 Departments are applying their discipline to water and water-related topics locally and globally.

- Faculty teach approximately 150 courses that address water and water-related topics.

- Estimated $45+ million annually in water related sponsored grants and contracts.

- Extensive water outreach – Colorado, nationally and internationally.
Northeast Colorado Research
Joel P. Schneekloth

Residue/Tillage Management Impact on Irrigated Production
  • Collaboration with Francisco Calderon, David Nielsen and Merle Vigil
  • No-till vs. Tilled with/without residue

Impact of Drought Genetics
  • Monsanto and Syngenta
  • Potential for water savings with different irrigation management
  • Efficiency vs. Savings
  • Differences in Soil Water Extraction

Other Trials
  • Impact of fungicides on plant health/yield
  • Potential for water use efficiency
  • Irrigated Barley (Miller Coors) as an alternative crop
Southeast Colorado Research

Tracking water and salt movement under Melons on subsurface drip irrigation

Collaborators: Blake Osborn, Mike Bartolo (AVRC), Lane Simmons (AVRC)

Research Question: How are water and salt vertically distributed in the soil profile under standard drip irrigation management?

Data Collection and Use

- Field monitoring with TDR probes
- Soil samples for salinity distribution
- Modeling using HYDRUS 1D/2D

Data are currently being analyzed. Interests from Melon producers is high, as is the possibility to expand this study to producers fields.
Water Policy and Collaboration

Around Colorado
Convening agricultural stakeholders to advise on the development of a publicity campaign about the problem of nutrients pollution from agriculture and how agricultural producers are employing best practices to tackle the problem.

In the Colorado River Basin
Working with agricultural producers in the Lower and Upper Basins to better understand what the obstacles to agricultural water conservation are and to strategize actions that can be taken to tackle the obstacles.
The purpose of the CSU Water Center is to provide leadership and support for faculty and students working to improve water resources.

WATER CENTER INITIATIVES

Research: provide faculty seed grants to strengthen partnerships and collaboration

Education: Sustainable Water Interdisciplinary Minor (SWIM)

Engagement: serve as the entry point for water research, education and engagement activities at CSU

www.watercenter.colostate.edu
The Colorado Water Institute (CWI), an affiliate of Colorado State University, exists for the express purpose of focusing the water expertise of higher education on the evolving water concerns and problems being faced by Colorado citizens.

http://www.cwi.colostate.edu/
Our Mission:
The Colorado Climate Center, through climate monitoring, research and service, supports and enhances the mission of Colorado State University to help meet the needs of the citizens of Colorado.

http://climate.colostate.edu
CSU “Water Tower”

- Public/Private Collaboration
- Lab Space
- Hands-On Environmental Education
- Research
- Event Space
Agricultural Water Conservation Clearinghouse

designed as a one-stop location for the latest news, literature, & tools regarding Ag water conservation

www.agwaterconservation.colostate.edu
Future of Irrigated Agriculture in Colorado?