

# Impact

Sharing the difference CSU Extension makes in people's lives and their communities.

## Role of local weather data evolves with changing times

*Improving the accuracy and usability of data recorded by a statewide network of agriculture weather stations is the continual goal of CoAgMet.*

### Issue

Research shows that producers can conserve water and increase crop yields by improving their irrigation management practices. However, this requires access to details such as soil moisture, plant water use, and current weather information. Timely access to weather and crop water use data allows producers and agricultural consultants to make informed irrigation management decisions that can save time, money, and resources.

### Extension's Response

In the early 1990s, Colorado State University Extension plant pathologists and the USDA Agricultural Research Service (USDA-ARS) Water Management Unit established the Colorado Agricultural Meteorological Network (CoAgMet). The network collects detailed weather data that is used for a variety of purposes, from estimating crop water use to forecasting pest and disease outbreaks.

CoAgMet began with a handful of weather stations located on irrigated farmland across the state. As the network grew, CSU's Colorado Climate Center (CCC) got involved. The CCC built a web interface that links to the weather data it now manages. CSU Extension and USDA-ARS remain key partners. CSU Extension specialists and agents contribute expertise to the development, usability and deployment of CoAgMet data.

CoAgMet currently consists of 66 weather stations that are located on both irrigated and non-irrigated farmland. Station instruments collect air temperature, precipitation, relative humidity, wind speed and direction, and solar radiation data that are uploaded daily to the CoAgMet website: [www.coagmet.colostate.edu](http://www.coagmet.colostate.edu).

The network's main purpose is to estimate crop and turf (lawn) water use, expressed as evapotranspiration (ET). Crop ET, expressed in tenths of inches per day, is an approximate calculation of how much moisture has evaporated from the soil, and transpired through plant stomata. Once ET is known, an informed decision can be made about the amount of water that crops actually need.

Over the years CSU Extension specialists have made usability improvements to the CoAgMet website, based on producer feedback. Today, users can view ET rates through a variety of filters: weather station, planting date, crops such as alfalfa, corn, onion, and potato, and turf. Users can also review monthly and daily ET summaries for a specific station and a given day. But producer usage via computer is limited since they are often busy in the field. To solve this dilemma, CSU Extension specialists are currently developing text-messaging strategies and smart phone applications that can deliver customized CoAgMet data.



### The Bottom Line

- The Colorado Agricultural Meteorological Network generates and distributes crop water use data that has far reaching applicability, from guiding irrigation scheduling and monitoring drought to determining Colorado's compliance with interstate water compacts.
- CSU Extension ensures that CoAgMet generates accurate and reliable data and continuously improves data delivery so that users get the information they need, when and how they need it.
- CoAgMet is held together with a resilient patchwork of local, state and federal funding sources that come and go.

### By the Numbers

- Number of CoAgMet weather stations: 66
- Annual cost to maintain CoAgMet: \$2,000

## Impact

The Colorado Agricultural Meteorological Network is a powerful management and support tool that has evolved in scope and use throughout its nearly 20-year history. Today, CoAgMet data has broad relevance and application for many users directly and indirectly engaged in production agriculture.

For those directly engaged in farming, several benefits can accrue from improving irrigation water management. According to CSU Extension water resources specialist Denis Reich, optimal irrigation water scheduling that is based on crop ET can decrease water use and increase crop productivity. CSU Extension water quality specialist Troy Bauder says it can also save time and money and conserve resources.

“It costs to pump and run your pivot,” Bauder says. “If you surface irrigate, you’re paying someone to do it, or you’re doing it yourself. If you let the ground get drier than it should, you’re costing yourself some yield. If you over irrigate, the excess can percolate into the groundwater. If you apply only the water that crops need, you can reduce possible environmental impacts, such as nitrate leaching.”

It turns out, however, that agricultural users may not be the number one CoAgMet audience. Nolan Doesken, Colorado State Climatologist, and Thomas Trout, research leader for the USDA-ARS Water Management Unit, estimate that CoAgMet is currently used by more water consultants, engineers and attorneys than agricultural producers or consultants. Doesken says that the complexities of Colorado water law, which demand a high quality, respected data set, have driven this surge in use. It has also focused educational efforts for this key audience. In fact, in March 2010 and 2012, USDA-ARS and CSU Extension hosted an ET workshop designed specifically for water consultants.

The Colorado Division of Water Resources (DWR) relies on CoAgMet data to estimate crop water use in key water basins. The Colorado Office of the State Engineer uses CoAgMet data in the management of the Arkansas River Compact (1948) between Colorado and Kansas. In support of this need, CSU Extension, in collaboration with the Colorado Agricultural Experiment Station and DWR, conducts extensive crop water use research at the Arkansas Valley Agricultural Experiment Station. Overall, research ensures that the equations used to generate ET are as accurate as possible for the crops grown in the Lower Arkansas River basin.

CoAgMet data is also used by scientists, CSU Extension agents, agricultural consultants, lawyers and homeowners to:

- Research nitrogen deposition and distribution from feedlots.
- Document drought/lack of precipitation for crop insurance on both crop failure and prevented planting. High use of this by CSU Extension occurred in 2002, 2003 and 2004.
- Count growing degree days to determine when insect pests will hatch. This tells consultants and growers when they should begin scouting.
- Complement weather data collected by agricultural consultants using their own regional weather stations.
- Schedule residential irrigation of cool season grasses.
- Provide documentation for lawsuits. CSU Extension has used weather data—rainfall, frost events, heat and wind—in lawsuits where it has been called in as an expert witness.

*“If you want to stay relevant with irrigation water management, CoAgMet is one of your more cost effective tools that’s publicly available. Optimizing water use can contribute significantly to bottom-line improvements via increases in productivity and reduced labor input. The profit improvement potential this represents means incorporating CoAgMet into your irrigation enterprise is worth the time.”*

– Denis Reich, CSU Extension water resources specialist

## Keeping CoAgMet Alive

In the beginning, CoAgMet had solid funding. Today, many of the network’s 66 stations are kept active with sponsor dollars. Water conservation districts, individual producers, county Extension offices, agricultural experiment stations, the Colorado Division of Water Resources and many other donors support CoAgMet by purchasing weather stations (each costs \$7,000) and maintaining them annually (a \$2,000 per station cost). Perry Cabot, CSU Extension water resources specialist, encourages CoAgMet partners to find a way to generate money from data that users now get for free. “These stations do a great thing,” Cabot says. “A tremendous amount of technical expertise has gone into developing the validity and value of CoAgMet data.” In the meantime, CoAgMet continues to seek new sponsors, add new stations, and generate high quality data that has found significant use all over the state.

## Contact Information

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