

ECONOMICS OF AGRICULTURAL WATER SHARING ARRANGEMENTS IN THE UPPER COLORADO BASIN GRAND VALLEY RESEARCH STATION (GRAND JUNCTION)



Perry Cabot (Research Scientist and Leader CSU Extension), Jenny Beiermann (Agriculture & Business Management Specialist), Julee Stephenson (Director of Communications)

PROJECT INTRODUCTION

The states in the Colorado River Basin are facing challenges of increasing scarcity as a result of drought and historic development that are calling for urgent changes in management of water resources. The Upper Colorado River Commission representing the Upper Basin states submitted a 5-point plan in response to the call from the federal government in June to increase the water flow in the Colorado River reaching Lake Powell by 2 to 4 million acre-feet for 2023. The CWCB suggests a re-initiation of the System Conservation Pilot Program (SCPP) which will compensate farmers to forego diversion meaning they leave their share of water in the river. There are questions needing answers in order to implement this program; 1) What should compensate water rights holders?, 2) What is the monetary value of water? Value in other forms of capital?, 3) What kind of theoretical model applies to this form of compensation? Valuation work can be started with enterprise budgeting which allows us to compare the monetary value exchanges under current and proposed scenarios with variations in irrigation use. Grand County ranchers and farmers have been working with CSU researchers to study the effects of foregoing irrigation in their high elevation environment at the headwaters of the Colorado River. This study is providing insight on the effects of foregoing irrigation on the incomes and yields as well as multi-year crop recovery and ecosystem function.

Communicating science to the public is an ever-evolving process. In modern times, we are seeing the utilization of social media as a forum for science communication. This field is ever-evolving as globalization rapidly expands, the age of information needs an effective manner of organization to usher in the age of integration. Publicizing and communicating new research in a quick manner can be done effectively with the use of social media, it is the manner of credibility as well as the balance of diverse knowledge and true wisdom. Diverse knowledge coming from indigenous people and working professionals can be shared with a wide audience and niche communities of people geographically distanced can build on social media, but knowledge often comes through in more impactful ways through deeper investigations like books or oral storytelling and relationships built through conversation, which is limited by systems when digital. The COVID-19 pandemic brought the lesson, with many others, that there is value in physical communications and while technology rapidly progressed to aid with the refinement of our priorities for physical connection, it clearly outlined a boundary that cannot be crossed by the expanses of the internet – the need for careful human-to-human contact for overall health of people and systems to global scale. There is an evolving code of ethics, statistical bias to account for, and a need for users to utilize critical thinking to determine credibility that all must balance for effective management of social media as a means for communicating scientific information.

INTERNSHIP GOALS

Develop a strong understanding of the systems of water management in Colorado particularly analyzing external factors of drought and law. This is critical knowledge to understand the goal of agricultural economics research projects in context. For the call on 2-4 million acre-feet of water on the Upper Colorado Basin states, this means determining the allocation of remaining water legally and what to compensate people who hold water rights they cannot receive this year.

Calculating and analyzing enterprise budgets to obtain data for determining the value of consumptive use irrigation water in Grand County. This data may be used to determine the compensation required in foregone diversion programs for water conservation.

Using the information at the research station to experiment with and analyze on a small scale, 841 people reached and 131 engagements according to Facebook for the page total, the effectiveness of communicating scientific information with social media.

HOW DOES THIS APPLY TO YOUR EDUCATION

This internship brought me from the theoretical understanding of concepts to the application of economic thinking in agriculture settings, including the preparation of enterprise budgets and basic valuation practices. From conversations with working professionals from farmers to economic consultants to policy makers, I gained broader insight on current management decisions and historical policies regarding water resources in Colorado. There is an important piece that proximity to and time spent within the Colorado River near Grand Junction this summer has contributed to my personal understanding of how and why people interact with water here the ways that they do. Water scarcity is an issue which can build or destroy the connections between people, and the hydrologic geomorphology of Colorado combined with the concept of private ownership have created a unique clash of interests shaping historic use leading to a grim future. The research to determine fair and feasible compensation for water rights holders involves complex valuation, an economic practice which tends to be viewed as the simplification of intricate social and environmental issues, but I believe has potential to provide a universal language to clearly communicate shared values across political and cultural boundaries. This internship has exposed me to a plethora of research and resources to work with moving forward as well as expanded the scale of my understanding of water and society.

WHAT YOU DID

In order to effectively portray people and projects, I participated in field work at the Grand Valley research station and in Grand County (Kremmling, CO). Projects at the station include research on the effect of cover crop variations on yield, the varying efficiencies of irrigation systems with a concentration on SSDI (sub surface drip irrigation), the success of chickpea varieties with staggered harvest times turned into an examination of soil quality, effectiveness of soil moisture monitoring devices, and this summer the station grew watermelons in the field designated for contribution to CSU Orchard Mesa research station's hunger relief initiative.

Through various meetings, tours, and overlapping research projects I had the opportunity to meet various stakeholders and hear diverse opinions on water management based on personal water use challenges and perspectives on broad water use challenges. In Grand County, the research is focused on the effects of foregone irrigation in fields at higher elevation near the Colorado River headwaters. Measurements are quantitative and qualitative; soil moisture and enterprise budgets, written and oral records of the land by ranchers and farmers.

This is all to study direct, indirect, and recovery impacts of foregone irrigation to conserve water. I aided with data collection, retrieving and sorting forage samples, and data organization for the creation of enterprise budgets. I also read various papers, articles, and books on water law and agriculture economics concepts including "Water Law for Non-Lawyers", "Cadillac Desert", various statements on the call from the Bureau of Reclamation to plan to increase flow from upper to lower basin states, extension articles and citizens guides for water use in the West, and research papers on water conservation methods.

Figure 1. (photos)



WHAT YOU LEARNED

The valuation process required for an enterprise budget, a listing of all income and expenses for a specific enterprise, involves the addition of all known inputs. The purposes of this research project are in part to determine the worth of water and this involves direct, indirect, and recovery impacts. Direct impacts are those impacts felt financially within the same year, or the monetary value of crops not grown or lost. Indirect impacts are seen within the year as well as the following years. These impacts include unexpected management changes and costs of ditch systems as well as ecosystem impacts including effects on the regeneration of aquifers and natural flooding patterns. The final impacts to consider are recovery impacts, all of those observed over a multi-year period such as the time it takes for crop recovery after a season of foregone irrigation. All of these impacts must be considered to obtain a reasonable estimate of total impact.

We found significant increases in metrics like "people reached", meaning the estimated views of a post regardless of friend status or interaction, when there were direct links to another person within a post. This emphasis on connection highlights the important use of social media platforms to connect people in separate geographic locations. For the purposes of the research station, social media was not intended to reach large volumes of people but rather captivate an audience of academic researchers and local agriculture producers, people who would benefit from contacting the station and those closely associated. Social media provides a neutral place for community members to engage should they have questions pertaining to agriculture research in their geographic region. The station has been able to host tours and reopen the doors to the public after COVID-19, but the alternate presence online increases accessibility to information to a wider audience.

Data.

The platform used this summer was Facebook which provides basic statistics on page performance. The organic reach of the page, the number of people who viewed posts at least one time, is 841. The median post reach per media type is 35 for images and 20 for links. The organic engagement, the number of post reactions, comments, and shares is 131 for the page. The median post reactions, comments, and shares per media type are 4 for links and 3 for images. The overall top performing post was an employee highlight of an extension employee, an entomologist, and a brief description of her work. It reached 402 people, compared to the median of 34 people, and received 60 reactions, compared to the median of 3 people. While we have a small set of data to draw conclusions, it can be observed that posts including people and photos will reach more people and potentially receive more reactions.

NEXT STEPS

The information above on social media reach statistics could be utilized by extension research stations to structure their outreach strategies on social media. A continuation of this project could include the addition of other social media platforms or the use of videos in posts as these avenues may lead to desired reach and engagement outcomes. The connection between research and community engagement is an extension specialty which will continue to be explored in the digital space.

The enterprise budgeting project is a piece of a greater puzzle of water conservation solutions and following steps will be continued valuation based on the direct, indirect, and recovery impacts, some yet to be seen, of foregone irrigation on farms and ranches at high elevations. The Upper Colorado River Commissions released a 5-point plan in early August with indications to financially compensate small water rights holders which will have diversions suspended in a temporary reorganization of priority use as municipality demand increases in both the upper and lower basins. Although a wetter summer, the 30-year drought and climate change will continue to place pressure on systems to adjust to scarcity and will ultimately require a solution addressing the foundation of agroecology, historical economic priorities and decisions, and the function of each of these on the hydrological cycles in the West.