



In the Midst of Drought

Special Double Issue
Volume IV, Issue 3
August 2002

Inside this Issue
The Evolution of Colorado's
Drought

Colorado's Water Use and
Administration

Enduring Drought

You Can Make a Difference!

Managing a Scarce Resource

by Cheryl Asmus, Coordinator, Family and Youth Institute

In 1968, *Science* published the now famous article by Garrett Hardin titled "The Tragedy of the Commons." Hardin describes the commons dilemma in terms of a pasture where any herdsman may graze his cattle. Of course, every herdsman will try to graze as many cattle on this land as possible. Any rational herdsman is going to attempt to maximize his own gains and add another animal, and then another, and another, and so on. When all the herdsman do the same, the common pasture becomes overgrazed, and unable to support any cattle.

According to Hardin and other researchers, some social system must be in place to preserve a common resource. Research also shows that there is less negative impact on everyone involved if all the members make cooperative, or group-rational decisions, instead of individual-rational choices (increased individual use).

We are in a drought. We all feel the effects: brown lawns, sickly trees, restricted water recreation,

continued on page 9

b r i e f s

The Widespread Effects of Drought

by Dennis Lamm, Professor,
Animal Sciences, Colorado State
University, and Co-chair,
Colorado State University
Cooperative Extension Drought
Task Force

As drought grips Colorado, its effects reach into every corner of our lives. Our pocketbooks, our health, and even our wildlife bear the brunt of this drought. Governor Bill Owens' Water Availability Task Force (WATF) keeps its finger on Colorado's pulse in these and other key areas, and its findings indicate deep and pervasive needs throughout the state.

Tourism

Colorado's tourist industry has already informally noted a decline in visitors due to the drought and wildfires. Rafting, for example, is down as much as 50 percent compared with a typical season. A look at Colorado history is one path to understanding the magnitude of this drought's effect on Colorado tourism. The 1977 drought brought a 40 percent decline in skier lift tickets, and a 15 percent loss of resort employment. The uninflated revenue lost in resort communities was \$76.8 million.

continued on page 4

Editorial Advisory

Board

Colorado State University

Cooperative Extension

Jan Carroll, Ph.D.,

4-H Youth Development Specialist

Mary Ellen Fleming,

San Luis Valley Area Agent

Elizabeth Garner,

Coordinator, County Information Services

Gary Lancaster,

Sedgwick County Director

Jan Miller-Heyl,

DARE To Be You Director

Verla Noakes,

Fremont County Agent

Nori Pearce,

Garfield County Agent

Debby Weitzel, *Publications and*

Promotions Specialist

Family and Youth Institute

Coordinator

Cheryl Asmus, Ph.D.

Co-directors

Mary McPhail Gray, Ph.D.,

Associate Director, Colorado State University Cooperative Extension

Bradford Sheafor, Ph.D.,

Associate Dean, College of Applied Human Sciences, Colorado State University

Briefs Editor

Margaret Graham

Invitation to dialogue

What issues and concerns would you like to see addressed?

Contact FYI at:

Family and Youth Institute

201 Gibbons Building
Colorado State University

Fort Collins, CO

80523-1501

Phone: 970-491-1936

Fax: 970-491-7859

E-mail: [m.graham@](mailto:m.graham@cahs.colostate.edu)

cahs.colostate.edu

www.cahs.colostate.edu/fyi/

Coming next:

Civic Involvement

The Evolution of Colorado's Drought

by Nolan J. Doesken, Assistant State Climatologist, Atmospheric Science, Colorado State University

Colorado is a dry state with an average annual precipitation of 17 inches.

Although many states average more than double this amount, Colorado maintains a thriving agricultural industry, large urban centers, strong recreational facilities, and a high quality of life for most citizens through effort, planning, diligence, and luck.

Despite our best efforts, there sometimes is just not enough water to go around. After nearly two decades of generous water supplies, weather patterns began to turn dry late in 1999. Since the fall of 2000, it has been particularly dry and this summer, Colorado was designated a drought disaster area. Although it's impossible to predict when this drought will end, it helps to review historical data and examine patterns of drought in Colorado to learn how it evolved.

The last multi-year drought in Colorado ended in 1978, and until recently, Colorado enjoyed abundant precipitation. As a result, drought is unfamiliar to many Coloradans. Population growth has surged in the past 20 years and new water demands have surfaced, including endangered species support, mountain snowmaking, and river and reservoir recreation. These new demands coupled with dry weather conditions brought us to a crisis that was several years in the making.

Conventional definitions of drought include water shortage, deficient precipitation, and water demand exceeding supply. The last of these phrases hits the mark most precisely. Supply (precipitation and snowpack levels) has been monitored for over 100 years. Streamflow readings and reservoir levels also provide a glimpse of available surface water supplies. All indices currently show moderate to severe or extreme drought over all of Colorado. Demand, including how water is used, when and how much is needed, and how

long it can be stored, makes up the other half of the equation.

Colorado's Water Supply

Colorado receives new water from one source: precipitation. It's then stored in usable water forms, including:

- snowpack
- streamflow and reservoirs
- soil moisture
- groundwater.

Precipitation transfers to one of these forms according to varying timelines. Soil moisture or snowpack rises almost immediately after precipitation, but streamflows, reservoirs, and groundwater aquifers respond more slowly to precipitation. Water can also be lost along the way to evaporation. So, brief summer rains rarely contribute to usable water supplies. Colorado's snowpack accounts for most of the usable surface water throughout the state during the spring and summer.

Precipitation in Colorado has remarkable traits:

- It falls 2 to 6 percent of the time, on average.
- It's extremely variable in both time and space – in fact, it's rare for the entire state to have above or below average precipitation at the same time, even for a month.
- Snow accounts for as little as 15 percent of annual precipitation in some parts of the state to almost 70 percent at high elevations, greatly affecting the balance of water, how much (or how little) evaporates, how much soaks in to the ground, and how much runs off into streams and reservoirs.
- A few storms contribute the majority of precipitation each year with more than half of Colorado's precipitation falling in 20 percent of the days when precipitation occurs. The presence or absence of just a few major storms can make an enormous difference to annual precipitation.

continued on page 3

The Demand for Water in Colorado

During the last 20 years, the types and locations of water demand in Colorado have undergone some changes. Demand for water comes from the following sources:

- **Agriculture.** As the source of the number one demand for water in Colorado, agriculture has cut its need over the past several years by introducing new crops (those requiring no irrigation as well as drought-resistant strains of traditional crops) and irrigation techniques.
- **Municipal and industrial water supplies.** Demand continues to grow as Colorado's urban and suburban areas expand. Most municipalities have extensive storage facilities to ensure reliability of water supplies, but more emphasis is being placed on water conservation each year.
- **Tourism/Recreation.** Dependent on seasonal precipitation, most recreational industries such as ski resorts and rafting companies rely on the snowpack or recently melted snow.
- **Wildlife/Forest and environmental uses.** Timber resources and tourism are supported through Colorado's national forests and parks. Recently, in-stream uses of water to support animal and plant life and provide habitats have surfaced as a new demand in Colorado.
- **Hydropower.** Colorado's peak energy demands occur in the heat of summer when water levels are falling.

Preparation for Drought

The state of Colorado has responded to and prepared for drought in several ways during this century. For example, state agencies support improvements in agricultural management, establishment of insurance programs, promotion of water conservation, and diversification of the regional economy. Colorado's first Drought Response Plan was developed and implemented in 1981. Revised over the past two decades, the plan coordinates the efforts of state agencies and related organizations that would be called upon to deal with drought, typically from the perspective of a particular economic sector (e.g. agriculture).

An analysis of Colorado's precipitation history has uncovered several findings.

- Drought is a frequent visitor to Colorado. Single-season droughts with precipitation of 75 percent or less of average for one to three months in a row occur nearly every year in Colorado.
- Drought rarely encompasses the entire state. Only about 5 percent of the time (or approximately one year in 20) does moderate or greater drought encompass at

least half of the state at the same time. During recorded history, moderate drought has never covered the entire state at the same time. One of the unusual aspects of our current drought is the fact that it encompasses the entire state.

- The most common droughts are short duration (six months or less).
- Multi-year droughts occur infrequently.
- There appears to be no such thing as a typical drought pattern. Each of the largest and most severe droughts has had its own unique formation and spatial patterns.
- One way of looking at drought is to determine "accumulated deficits." For example, if one region's average annual precipitation is 16 inches, but only receives 12 inches, the accumulated deficit would be 4 inches for that year. Colorado's worst droughts reach an equivalent deficit of about two full years of average precipitation. While our current drought is severe, accumulated deficits are on the order of one year's worth of precipitation, and this deficit has developed over three years.
- Short duration droughts can begin and end in any season. Major droughts with durations of one year or longer tend to begin in and end in the season that is locally the wet season, which vary from place to place in the state.
- Weather folklore is not supported through historical patterns.

Colorado has come a long way since the dust bowl years. We manage our crop and grasslands with soil and water conservation in mind. We store large volumes of water from wet years for use in dry years, and from wet seasons for use in dry seasons. We divert water from areas with lower demands to areas with higher demands. Still, history has a way of repeating itself. Our study of past droughts shows that the worst droughts are multi-year droughts. Vegetation dries up, soils blow, stored water reserves are gradually depleted, and wells go dry. What begins as a minor inconvenience can, for many people, end in the loss of revenues, property and livelihoods.

Wildfires

Fire is one of the most visible and frightening effects of drought, and the impacts of fire are severe on watersheds. Erosion can be extreme in the years immediately following fires. Water quality is adversely affected, and the taste of the water is affected (Denver has already been impacted despite valiant efforts to stem the wildfire effects). Colorado's recent propensity for very large and rapidly spreading wildfires appears to be an indication both of the severity of our current drought situation and a consequence of many years of fire suppression following the years of

The Evolution of Colorado's Drought continued from page 3

forest harvest that took place in the 1800s. Watershed managers are well aware that overgrown forests also produce less runoff than thinned, managed forests. So, questions about wildland management and its relationship to our water supplies remain unanswered.

Looking Ahead

Drought has been a part of Colorado's history, present in some form almost every year for the past 100 years. Even so, the current drought is painful and with each passing week becomes more and more of a crisis. Wildfires, unplanted fields, early sales of livestock, high hay prices, brown yards and worried resource managers are just a few of the current impacts. We can take hope from our ancestors. This drought will end – we just don't know when. As we endure this crisis, we glean more lessons so that we will be ready for drought when it returns, as it inevitably will.

Source

McKee, Thomas B., Doesken, Nolan J., Kleist, J., Shrier, Catherine J., Stanton, William P., "A History of Drought in Colorado: Lessons Learned and What Lies Ahead," Water in the Balance Report Series, No. 9, Colorado Water Resources Research Institute, Fort Collins, CO: February 2000.



The Widespread Effects of Drought continued from page 1

Tourism brings an average of \$8.5 billion in revenue into Colorado, and supplies jobs for 8 percent of Colorado's nonfarm job force. It also earns approximately \$550 million in state and local tax revenue. The areas of Colorado most susceptible to economic drain due to drought are primarily the high mountain counties such as Eagle, Grand, Pitkin, Summit, and Routt. These counties account for over half of the tourism activity in the state, potentially compromising about \$291 million in tax revenues.

The 220,000 tourism jobs in Colorado could dwindle if the drought intensifies. When tourism earns about \$19 million a day in Colorado, even a 10 percent decline would mean a loss of \$700 million annually.

Currently the WATF recommends public education and outreach to inform potential tourists that sports such as rafting, fishing and camping are still viable and enjoyable in Colorado. Professional organizations such as the Colorado Professional Golfers' Association, the Colorado Restaurant Association, and the Colorado Hotel and Lodging Association recommend voluntary measures to help conserve water. For example, one recommendation given to restaurants is to ask patrons if they would like water rather than automatically serving it. Since it takes four glasses of water to clean one water glass, this small change in behavior can save quite a bit of water. Local communities with a heavy dependence on tourism for income were asked to develop plans to mitigate the impact of drought and wildfire.

Agriculture

Agriculture is already suffering due to the drought, and it accounts for 3.9 percent of the state's workforce and 48 percent of Colorado's land area. Livestock makes up about two thirds of farm revenue for Colorado with crops bringing in the remaining third. Spiraling feed costs are forcing the sale of livestock, which lowers the amount that ranchers earn as they sell their cattle.

Half of Colorado's winter wheat was gone as of early June, costing Colorado farmers approximately \$100 million in lost revenue. Soil moisture levels are rated as inadequate in more than 90 percent of surveyed fields, which makes fall wheat planting a grim prospect. Without significant, widespread rain during August, many irrigated crops are going to suffer substantial yield losses.

All of Colorado has been declared a drought disaster area, allowing Colorado farmers to apply for low-interest loans. Colorado is one of seven western states in which the U.S. Department of Agriculture has opened lands enrolled in the Conservation Reserve Program to farmers and ranchers for grazing and hay production.

Wildfire

Wildfire expenses will add to the economic burden of drought. The 2000 wildfire season provides a glimpse of potential costs to Colorado due to wildfire. State and local governments spent \$6.5 million in firefighting expenses in 2000, \$3.2 million of which was paid by the Federal Emergency Management Act. The Hi Meadow and Bobcat fires of that season cost insurance companies approximately \$18.5 million in personal property, living expenses and smoke damage claims. The most expensive forest fire of record (in California during 1991) cost insurance companies \$1.7 billion.

More than 1,350 wildfires have sparked in Colorado as of the end of July, a number that is on par with other years. The difference this year lays in the number of acres burned:

The Widespread Effects of Drought continued from page 4

over 350,000 acres this season. Without drought, that number would be around 70,000. Twenty of this season's largest fires have racked up in excess of \$134 million in costs.

The WATF has recommended that local governments and fire districts develop an inventory of critical assets that need to be maintained during fire responses. Increased criminal penalties for arson and liability for negligence in causing wildfire have been recommended, and some legislative changes have already been enacted, including one bill that results in jail time for people who are caught throwing lit cigarettes out their car windows.

Drinking Water and Treatment Facilities

Regulation of Colorado's 2,000 drinking water treatment systems is the responsibility of the Colorado Department of Public Health and Environment/Water Quality Control Division (WQCD), which also takes care of municipal and industrial wastewater treatment systems. With fire protection systems tied to drinking water supply systems, there's a concern that some systems, particularly those in small towns, will run short. Local public water systems are responsible for securing water from alternative sources, which can lead to enormous expense. With little federal assistance for this kind of emergency, small public water systems will have a serious burden if their supplies dwindle. The WATF is compiling a list of potential sources for loans and grants if this situation arises. It also is working to develop incentives for public water systems with reliable sources to align those with less reliable supplies.

Public water systems are further threatened when low flows downstream from waste water treatment plants lead to increased water temperatures, nutrient concentrations and algal blooms. Fish kills and other problems, such as algal fouling of filters at treatment plants and unpleasant taste and odor in treated drinking water, then become problems. Recreational water users run risks when increased concentrations of pollutants result in water-borne illnesses due to elevated levels of microbial contaminants *E. coli*, *Cryptosporidium* and *Giardia Lamblia*. Areas of particular concern include Bear Creek, Boulder Creek, Cherry Creek, Clear Creek and the South Platte River in Front Range population centers. Several small streams across the state are flowing at less than one cfs, the minimum measurable flow level.

The WQCD is working with the WATF to refine existing warning systems so that potential problems are detected early. The Colorado Division of Water Resources and the U.S. Geological Survey will be involved with the WQCD, monitoring flow levels in key

stream segments where these problems could materialize.

Denver Water projects April 2003 reservoir storage at 30 to 35 percent of average fill. Antero and Williams Fork Reservoirs will be drained this year. Dillon is low and waning. More municipal water restrictions are on the horizon.

Local water districts have been asked to closely monitor available water supplies, tracking the need for water restriction and notifying the Governor and the WATF when help is needed. The WATF also has recommended that funds be available for the development of drought planning efforts at the local level, asking more advanced water providers (such as Denver Water) to provide technical expertise to less sophisticated water providers in the development of drought contingency plans and mitigation measures. Water storage is another area under review, with legislation drafted to repair water facilities.

Wildlife

Both aquatic and terrestrial wildlife are challenged by drought. Threatened and endangered species are at an elevated risk during drought conditions, and there are generally increased predator/human interactions as food supplies for animals dwindle. Suggestions for preventing encounters with wildlife are the same during drought and nondrought conditions. Two important reminders are to refrain from feeding wildlife, as it is illegal, it risks the spread of disease and it cultivates wild animals' dependence on artificial, unreliable food sources. Big game should be observed from a safe distance, and urban sightings should be reported. The Colorado Division of Wildlife has an education section of its website (www.wildlife.state.co.us) that contains additional information regarding human/wildlife interactions.

Migratory bird patterns also are affected by drought, and rangelands suffer from drought depletion. The WATF recommends identifying critical land areas, streams, lakes, and reservoirs, and monitoring them closely. By providing

continued on page 6



The Widespread Effects of Drought *continued from page 5*

emergency instream flow protection and enacting drought emergency closures, fishing restrictions, and fish salvage operations, the task force can mitigate the threats. Education for water and wildlife users is a key strategy for enlisting help in conservation.

Energy

Energy supplies are not currently threatened. Approximately 4 percent of Colorado's electrical energy has a hydroelectric source, but projections for 2002 indicate that facilities will be unaffected. Continued drought, however, will likely result in serious restrictions, and high water demands by wildfires could also amend this prediction. The WATF has recommended measures to protect the integrity of gas and electric transmission lines and ensure strong communication between emergency management and utility personnel in the event of wildfires.

Future

Drought conditions are evolving. As the summer progresses, the drought will continue to be monitored. Additional reports from the WATF are available online at <http://cwcb.state.co.us/>.

Sources

- Colorado Water Conservation Board. (2002). Impact Task Force Drought Assessment and Recommendations May 1, 2002. Denver, CO: State of Colorado Water Availability Task Force.
- Colorado Wildfires. (2002, July 29). *Rocky Mountain News*. <http://cfapp.rockymountainnews.com/wildfires/index.cfm#headlines>
- Foster, D. (2002, June 1). Winter Wheat Drought Loss: \$100 Million [Electronic version]. *Rocky Mountain News*. http://www.rockymountainnews.com/drmn/state/article/0,1299,DRMN_21_1181667,00.html
- Linn, A. (2002, June 12). State Amps Up Tourism Ad Plans [Electronic version]. *Rocky Mountain News*. http://www.rockymountainnews.com/drmn/business/article/0,1299,DRMN_4_1203105,00.html
- Too Close for Comfort: How to Avoid Conflicts with Wildlife in the City. (2000). [Brochure]. Denver, CO: Colorado Division of Wildlife.
- Waskom, R.M. (personal communication, July 30, 2002)



Colorado's Water Use and Administration

by Dan H. Smith, Professor, Soil and Crop Sciences, Colorado State University

Colorado is generally categorized as semi-arid, so issues related to water use and conservation are commonly discussed, both privately and in the media. As the intensity of the current cycle of drought has increased during the past year, public discussion about water in newspapers, magazines and various forms of electronic media has increased significantly. In addition, state and local public agencies have initiated action designed to minimize current impacts of water shortages and extend supplies in anticipation of continuing dry conditions.

One of the results of recent events is heightened public awareness about water in the west. For some, however, confusion exists because of a lack of knowledge about the basic nature of how water is used under normal conditions in our state and what provisions exist to cope with this emergency situation.

How Water is Used in Colorado

Despite the rapid growth in Colorado's population in recent decades, most of the water used in the state (about 85 percent) is still devoted to irrigation of agricultural crops. All other uses, including domestic, municipal and industrial uses, account for the remaining 15 percent. This pattern of use is the product of several different factors. Historically, agricultural development in Colorado followed closely on the heels of mining and quickly replaced it as the state's leading industry early in the twentieth century. The growth of irrigated agriculture, in turn, was fostered by development of large-scale water projects, many of which were subsidized by the federal government. This development was essential for irrigation because of the high water requirements of irrigated crops (due to the large difference between crop water requirements and available precipitation) and the vast amount of land area devoted to irrigated crops.

Another important element of water use is the fraction of consumptive use associated with a particular use. Consumptive use means that the water evaporates as a consequence of its use. If the fraction of consumptive use is small, most of the water withdrawn from a stream system is returned to that system. Most indoor household and commercial uses of water have very low levels of consumptive use. Alternatively, agricultural irrigation and landscape uses result in large amounts of consumptive use, and the amount of water consumed by each of these uses is largely associated with the amount of land area to which water is applied. Within a given region of the state, the consumptive water use for an acre of irrigated alfalfa is about the same as for an equal amount of land area

continued on page 7

Colorado's Water Use and Administration continued from page 6

devoted to irrigated urban landscape or a golf course. Given this, the much greater area devoted to irrigated agriculture in Colorado (around 3 million acres) as compared to that of urban development accounts for the fact that irrigated agricultural use dominates all other uses.

Colorado's Unique Water Allocation System

The water-short environment of the west required the development of new institutional arrangements for allocating this scarce resource among competing uses. Water rights in the U.S. originally were based on the Riparian Doctrine because of the climate and geography that existed in the areas settled earliest. In the east, rainfall is generally abundant, and the landscape is permeated with brooks, streams, and rivers. According to riparian law, water rights are accorded to owners of land bordering water bodies. Use is restricted to reasonable use, which means that water must be used close to the stream and all owners share in shortages.

In the west, new arrangements for water allocation evolved first in the mining communities of California and Colorado in the mid-1800's. With each new gold rush, water demand for processing ore quickly outstripped supplies as the number of claims along a given stream increased. The water allocation system that seemed most logical was adapted from the practice of filing mining claims. The first person to occupy and work a site established a legal claim to the mining rights on that site. Likewise, the first person to put water to a productive use established the highest priority for water use from a particular stream.

This system of allocation, called prior appropriation, quickly spread throughout the western US and eventually was incorporated into state statutes. Colorado was the first state to formally adopt this Doctrine of Prior Appropriation by including it in its state constitution in 1876. Using this doctrine, the priority of a water right is determined by the date when the water was originally put to use (or the intent to do so is established). The earliest rights have the greatest seniority.

This is especially relevant during periods of drought because the most senior rights have the highest priority of use, which translates to the greatest assurance of supply. As a general rule in Colorado, agricultural rights within any given water basin (each major river and its tributaries comprise a water basin) are the most senior rights because agricultural development occurred before rapid urban growth.

The Colorado water rights system provides certainty and protection to all water users, while allowing for

flexibility through changes of use and the transfer of rights. Water rights are granted through regional water courts, which issue a decree for each water right. These decrees are then administered by the State Engineer. The decree specifies how a water right is exercised, including the quantity, source, and timing of the withdrawal and how the water is to be used.

'Specification of how the water is used is extremely important in this system because different uses (irrigation vs. municipal, for example) may impact downstream users in different ways. The priority system of water allocation allows for changes in use for any existing decreed water right. If the change of use (sometimes called a water transfer) is to be permanent, a careful review by the water court is required. In most cases, this judicial review includes the input of other water users – even those with lower priority rights – who might be affected by this change of use. When a change of use is approved, the new use has the same priority as the original one. Temporary changes of use that do not violate the original terms of an existing decree can occur with the approval of the State Engineer.

Conserving Water

The characteristics of how water is currently used and administered in Colorado provide insight into the most effective strategies for dealing with the current drought. Recommendations and emergency regulations for conservation of water in urban settings have focused on landscape uses. This strategy is logical because landscape irrigation accounts for approximately 50 percent of all domestic water use in urban areas and much of this is consumed by evaporation or plant losses. Confining sprinkler application to the coolest period of day (between midnight and a couple of hours after sunrise) is another sound conservation practice because it reduces evaporative losses during application, allowing more of the applied water to enter the soil where it is available for plant uptake.

Where watering is limited to intervals of every three or four days, homeowners may need to apply greater amounts of water on the approved days. When higher watering rates are used, application should be closely monitored to make sure that all the water being applied is taken into the soil and no runoff occurs. In some cases water suppliers in urban areas are suggesting that homeowners reduce the amount of water applied to landscapes. In most cases this can be done without affecting the long-term viability of plants if water application is carefully managed. Detailed guidelines for managing landscape irrigation under various scenarios can be found at a new CSU Cooperative Extension web site (<http://drought.colostate.edu/>).

Enduring Drought

by John Stulp, Prowers County Commissioner

“We are overdue for another dry spell like the fifties,” my father-in-law’s words are still strong in my memory even though he passed away six years ago. As a lifelong farmer, he knew that drought was inevitable. I sure wish he were here to advise us. Jane, my wife, and I operate a dryland (real dry this year!) wheat farm and commercial beef grazing operation south of Lamar, Colorado. We started farming with Jane’s father in 1974, and this has been our home ever since.

We have witnessed a wide variety of weather over the last 28 years, but this year is the most extreme. We are actually in the third year of a drought because we received less than 14 inches of precipitation over the last three years. Normally, we average 12 to 15 inches per year. While the last couple of years have been dry, the timing of the limited moisture was serendipitous, and we had some production each year. This year is different. With less than one inch from September through May, I have never seen anything this dry! Area precipitation totals confirm that southern Colorado is the driest it’s been for 100 years.

As a Prowers County commissioner, I am witnessing firsthand the most dire, widespread effects of drought of the past 50 years. Usually, one aspect of our local agricultural industry may survive natural disasters better than the others. However, this year, all aspects of our local ag economy are being devastated by this drought. Between 75 and 80 percent of the winter wheat crop is gone with the remainder doubtful. The grassland looks like it’s the middle of winter with no green growth visible, and the irrigated portion of the county is nearly out of irrigation water with some ditches already out for the entire season. I hear numerous accounts from local business people about the downturn in the local economy – less business and higher accounts receivable caused by the drought.

Our farming and cattle operation normally employs between eight and ten people during the busy summer season. This year, we only have four employees, and have reduced their normal hours by 10 to 20 percent. Our routine purchases of farming and ranching inputs are being closely monitored – no new equipment. We’ve only used a third as usual diesel at this point in the season and have yet to buy any fertilizer. We have milo seed and forage sorghum seed waiting to be planted; however, if it doesn’t rain, it will remain in the bag. Normally, when we have some failed wheat, we follow those acres with milo, forage sorghum or sunflowers. One of our planting concerns with the extremely dry conditions is that the

drought may actually cause more pulverization of the already vulnerable fields. So we wait for rain.

Our cattle duties have actually increased for this time of year since we are feeding at a time when the cattle would usually be getting all the feed they need by grazing new grass. We also watch the cow calf pair market closely because we may have to sell our herd in the next few weeks if rain doesn’t come.

I sense some uneasiness about job security from some of our employees. I’ve also had an increased number of people applying for seasonal work, whereas, for the last several years, I have had trouble finding farm workers. We have reassured our employees that we will have work for them, and we will have some income from crop insurance and government payments, but a decent wheat crop still beats insurance anytime.

Our neighbors are handling the drought in similar ways, some are selling cattle, some will have no wheat or very little to harvest, most have fewer or no employees. There is a noticeable decrease in farm activities as everyone is waiting for the big rain. We are all optimists, or we wouldn’t be farming.

We may see the biggest negative financial impacts on our operation this year, and we realize that it will take several years to recover. Our hope and prayer is that this drought will end soon because the economic pressures will begin to compound themselves.

We cope with the stress of this disaster in a number of ways. One is putting a positive spin on bad circumstances. With less field work (none right now since even the weeds won’t grow), we have gotten a few of those winter and a-rainy-day jobs done that have been on hold for some time. Family at a time like this is extremely helpful. Jane is my business partner and best friend; together, our faith and family keep us going even when the temperature soars near 100 degrees and the wind blows dust at 30 to 40 mph.

Each of our five adult children makes land payments on his or her individual parcels of land and since each helped in the formative years with the operation, they have a high level of interest and understanding of what mom and dad are going through. The jury is still out as to whether we’ll be able to entice some of them back to the operation. (We might be accused of child abuse to ask them to leave good jobs with good benefits and much shorter hours to come back and farm).

Our church family is a source of comfort and prayers, and even though many members of the congregation are not farmers or ranchers, everyone seems to understand the drought situation and is very supportive. Our family feels it is important not to dwell on the negative but continue to be involved in normal family, church, and community activities. A good sense of humor is helpful.

Enduring Drought *continued from page 8*

One neighbor reported he had a half-inch of rain during the night, but the full moon had dried it out before morning. Did you know that when it rained forty days and forty nights that Lamar received one-half inch?

This drought has brought with it a new set of complex and difficult decisions for our business. Potential conflicts with crop insurance companies, new cash flow concerns, concern over keeping fields from blowing, and employee inexperience with drought situations are just a few of the new stressors on top of a normally high stress occupation. I've been fortunate to have the benefit of farming experiences of my father and father-in-law from previous droughts in eastern Colorado. A good relationship with my banker, good neighbors, and an understanding family all help in persevering in times like this. We take the scripture to heart that we will not be given more trials than we can endure – if the Lord closes a door, he'll open another.

Managing a Scarce Resource *continued from page 1*

threats to the livelihood of farmers and ranchers. Due to the drought, the state of Colorado, among others, is suffering from a scarcity of a common resource: water. Water, jointly owned and used by many people, is typically adequate if everyone consumes at an appropriate rate. With the drought, this adequacy is in question.

Our first article in this special double issue is written by Dennis Lamm, Animal Sciences Professor at Colorado State and Co-chair of the Colorado State University Cooperative Extension Drought Task Force, and it focuses on the common uses of water and the impacts of the drought.

What is the definition of drought? How did it happen? Where does the water come from? Who uses it? How are the experts responding to the drought? What does the future hold? Nolan Doesken, Assistant State Climatologist in Atmospheric Science at Colorado State University, provides answers to these questions and more.

The tragedy of the commons tells us that a common resource such as water is best preserved if managed by a system. Dan Smith, Professor of Soil and Crop Sciences at Colorado State University, describes Colorado's water management system.

Our next article is written by John Stulp, a rancher and County Commissioner, who gives us both a personal and community view of the impacts of the drought in rural Colorado.

The commons dilemma also tells us that cooperative decisions decrease the negative impacts on a resource. Therefore, we offer some suggestions on how each individual can make that group-rational, or cooperative decision, with "You Can Make a Difference!"

You Can Make a Difference!

Cleaning

- If you run your washing machine and dishwasher only when they're full, you could save up to 1,000 gallons each month.
- Rather than using water to clean your driveway or sidewalk, get out a broom and sweep it – you'll save up to 80 gallons each time.
- When you clean your fish tank, water your plants instead of dumping the water out.
- Check for a leak in your toilet by putting food coloring in the tank. If it seeps into the toilet bowl, you've got a leak, which wastes as much as 600 gallons each month.
- Attach a nozzle to your hose so that you can turn it off when you're sudsing your car – you'll save about 100 gallons each wash.

Cooking

- Keep a pitcher of water in the refrigerator rather than running the tap and waiting for cold water.
- Wash your produce in the sink or a pan of water rather than running water from the tap. Then water your plants using that water.
- Instead of using running water to thaw meats and other frozen foods, use the microwave or thaw them overnight in the refrigerator.
- Heat water on the stove or in the microwave rather than run the tap. If you do run the tap, capture the water in a tub and use it to water plants or soak dishes.
- Cut down on your garbage disposal use by peeling vegetables onto paper towels and then putting the waste in the trash or compost. You'll decrease the amount of nitrogen, phosphorus and organic matter added to wastewater, improving water quality and prolonging the life of septic tanks.
- Scrape dishes but don't rinse before loading the dishwasher, especially if you'll be running the dishwasher within a few hours. If you do rise, catch water in a tub and use that water for rinsing rather than using a running faucet.
- Run only full dishwasher loads. Select the cycles that use the least number of washes and rinses. You can cut the amount of water used for dishwashing in half by choosing short-run cycles.

continued on page 10

You Can Make a Difference!

continued from page 9

Bathing

- Check your shower to see how fast water comes out – if you can fill a one-gallon bucket in 20 seconds or less, get a water-efficient showerhead.
- When you turn off the water while you brush your teeth, you save four gallons a minute.
- If you turn off the water while you shampoo, you'll save more than 50 gallons each week, and if you turn it off while you shave, you can save more than 100 gallons a week.

Gardening

- Mulch around plants helps to reduce evaporation, saving hundreds of gallons of water each year.
- Check to see whether your lawn needs watering by walking on it. If you leave footprints, you need to water.
- Mow your lawn less often (mowing strains it, requiring more water), or mow it on a higher setting, keeping it longer reduces the loss of water due to evaporation. If your grass is brown, it's probably dormant (not dead!) so you only need to water it every three weeks. When the drought ends, and it receives regular water, it'll turn green again.

- When you add or replace a flower or shrub, select a low water use plant and save up to 550 gallons of water each year.
- Be alert for increased wildlife traffic around your garden. Contact your Cooperative Extension office for support on protecting your garden.

Sources:

Kendall, P. (2002, July 30). Take Steps to Conserve Water.

[Electronic Version]. *Fort Collins Coloradoan*.

<http://vh80003.vh8.infi.net/news/stories/20020730/lifestyle/327657.html>

Water: Use it Wisely. Park and Co.

<http://www.wateruseitwisely.com/index2.html> 2000.

