by Douglas S. Helmke, LG

CoCoRaHS: a backyard measuring and reporting system

People of the plains states always keep half an eye on the weather, regardless of the time of year. The rest of the country seldom pays attention to non-severe weather. Those others don't have to. They can get a weather forecast by just looking at a calendar. Sure, that's an exaggeration and a generalization, but not many from other parts of the United States will win an argument that they experience as much variation in temperature, wind and precipitation as we do from day to day, week to week or year to year. The extreme climate of the middle third of the U.S. poses challenges to public water systems. Alternating periods of drought and excessive precipitation require water professionals to be ready for anything. We have water conservation plans to control excessive demand and emergency plans to react to sudden interruptions of supply. Parts are stockpiled to make late evening repairs with little delay. Many systems measure groundwater levels on a regular basis to compare with past measurements. And because serving Kansans with sufficient quantities of high quality water begins with precipitation, the Collaborative Community Rainfall, Hail and Snow Network will interest many people whose lives are directly affected by the weather.

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The Collaborative Community Rainfall, Hail and Snow Network, or CoCoRaHS for short, is headquartered on the Colorado State University campus in Fort Collins, Colo. Its original purposes were to serve as a meteorology education project and to monitor the precipitation in and around Fort Collins, Colo. Fort Collins was hit with a surprise flash flood in 1997, when the southwest part of town received over 12 inches of rain, while less than two inches fell only a few miles away in the east part of town. The resulting flood took five lives and caused more than $200 million in property damage. The organizers were pleasantly surprised that people in the community and surrounding area were so enthusiastic to participate in a rainfall measurement program that would serve to enhance the protection of lives and property in their community. Today, thousands from the Rockies to the East Coast participate daily.

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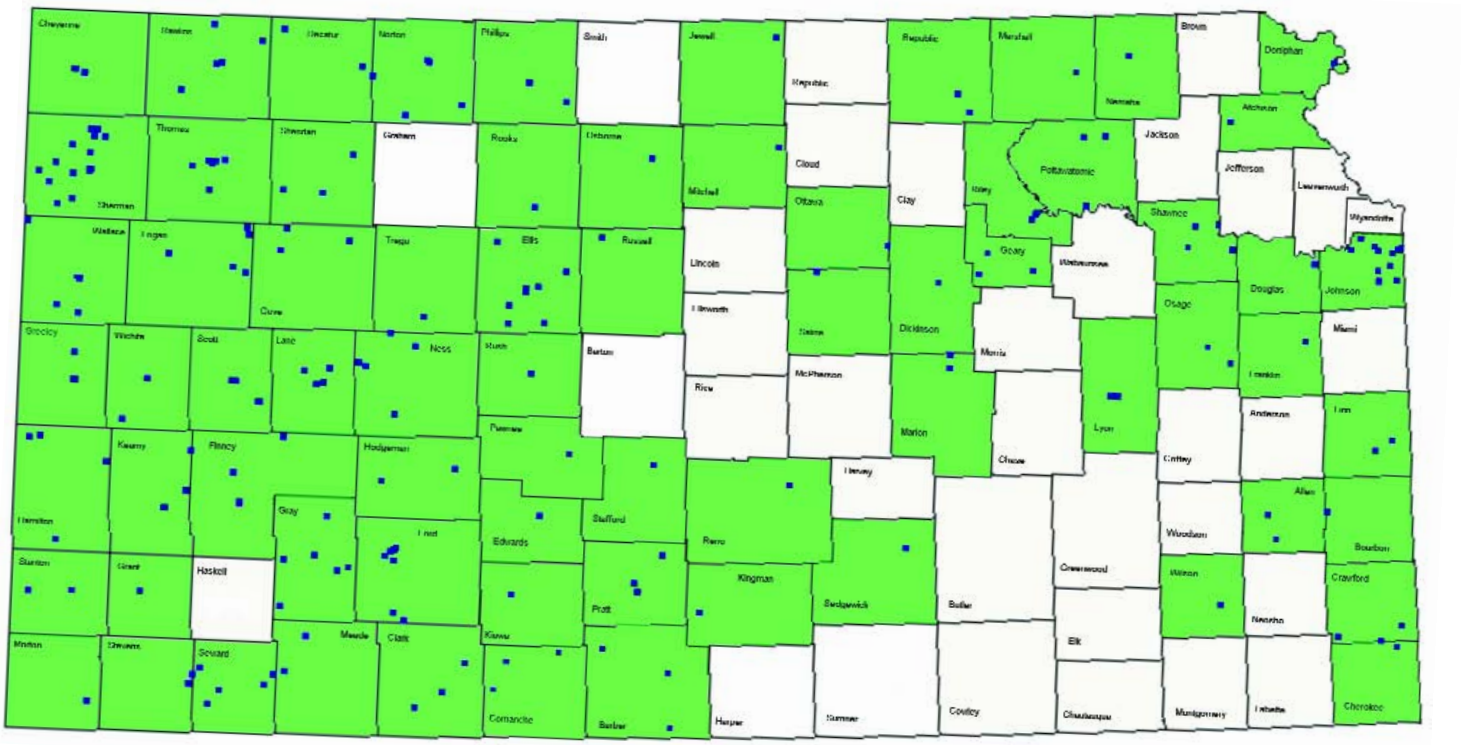
The National Weather Service (NWS) has had observers of weather data for years, and for NWS purposes, having a few observers per county is sufficient. At some point in the past, they reached a fork in the road where they had to choose if they wanted

Reading the gauge is as simple as removing the small tube from the large tube and comparing the lowest level of the water's meniscus to the graduations on the tube.



CoCoRaHS observation stations, indicated by blue squares, are located in over 67% of Kansas counties, highlighted in green. A goal of the program is to have at least one station in every rural township (36 square mile area) and one station per square mile in urban areas.

to use their funds for more observers or more technology. The technology path that was chosen has been instrumental in predicting and remotely "observing" severe weather and our communities have benefited from it. It is comforting to know that they can often "see" a tornado in the pitch blackness of a 2:00 A.M. thunderstorm. Unfortunately, the NWS radar failed to accurately estimate the large amount of rain that fell on Fort Collins that day back in 1997. CoCoRaHS fills the need of allowing everyone interested in precipitation observation and reporting to contribute to the existing data collected by the NWS and others.

CoCoRaHS was started in 1998 to supplement the technology with old-fashioned volunteer observers who shared an interest in weather and helping make their community a better place. The National Science Foundation awarded a grant to CoCoRaHS to expand beyond Colorado and currently, 10 states and the District of Columbia are included in the network. In addition to the other 10, Nebraska has its own affiliated program with its own reporting and recording system called the Nebraska Rainfall Assessment and Information Network (NeRAIN). As of May

2006, Colorado has the most active stations with 1,985. New Mexico and Wyoming had the next most with Kansas and Missouri not far behind. This summer, Oklahoma will start participating in the program.

As of May 2006, there have been approximately 227 stations established in Kansas with 216 of these considered to be active. Although this might seem like a lot, over 32% of Kansas counties are without an observer. Many of these 34 counties are located in the more populated central and eastern parts of Kansas. Sherman County, in northwest Kansas, has the most observers who have filed precipitation reports in 2006 with 11. CoCoRaHS has a goal that at least one station be established in a square mile in urban areas. Their goal for rural areas is a station in every township, or 36 sq. mile area.

Because many of the registered and active observers are in western Kansas, it can be safely assumed that most of these observers are involved with agriculture. The precipitation they receive plays a big factor in their decision making regarding irrigation scheduling, cropping and pasture management. When a number of observers are located in an area, better decisions can be made because more confidence can be placed on regional trends. By participating in the Network, observers are able to save the rainfall data for their station and compare it to the data saved by their neighbors. Central and eastern Kansas observers can benefit agriculturally too, and the data should also be useful to make better predictions regarding runoff and flooding.

When a person volunteers to participate, they will be asked if they need an acceptable rain gauge that measures in hundredths of inches. The State Climatologist in the Kansas State Extension and Research Services Weather Data Library will make arrangements to allow one to be purchased at a reasonable cost. The observer will also be asked to determine the latitude and longitude of their proposed station location. A Web site address will be provided that converts addresses and section-township-range legal descriptions to lat-long coordinates. After registering and receiving the rain gauge, all that is required is that the gauge be mounted where trees and buildings will have the least amount of influence on the collection of precipitation.

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The rain gauge supplied by K-State Extension is made of clear plastic. It has four parts; a tube with a diameter of approximately 1¼ inches with graduations in hundredths of inches to a total of one inch, a larger tube with a diameter of approximately four inches to hold the smaller tube and catch its overflow, a cap which directs precipitation into the smaller tube and a mounting bracket. This rain gauge will hold over 11 inches of rain.

Observers are asked to report their precipitation results daily, even if there is no rainfall. Having no precipitation is as much a recordable event as having a record setting event. When no report is filed, all that can be determined is that no report was filed. To compare similar data, observers should check their rain gauge

measuring in hundredths of inches as close to 7 a.m. as possible. Observations made two hours before or after 7 a.m. are accepted. If a daily reading is not made between 5 a.m. or 9 a.m., the

A rain gauge, like this one available from K-State Extension's Weather Data Library, is the standard tool for measuring precipitation in the CoCoRaHS program. It measures precipitation in hundredths of inches and has a capacity of over 11 inches. It is very accurate, and is easy to mount on a flat-sided fence post.

observer can file a multi-day reading which is still useful for weekly, monthly or annual data analyses. City of Enterprise Operator/Manager Paul Froelich volunteered recently to be an observer for CoCoRaHS. He has previously made measurements and reported information to the National Weather Service for many years. He finds that the daily reporting of information via the internet for CoCoRaHS is much easier than the telephone reporting system established by the NWS.

Participation in CoCoRaHS is free. The data that is collected is also available free to the public. Tables of station data can be downloaded for review and maps showing color-coded stations based on daily precipitation totals are particularly interesting. To review the program, to view the daily precipitation maps or tables of data and to volunteer, direct your internet browser to http://www.cocorahs.org. Volunteers must have a computer with internet access, a location that can accurately measure precipitation, and the discipline to record and file the data daily. Those of us who start the day by checking e-mail can make the CoCoRaHS Web page one of our start up pages. It is a great way to be reminded that the previous day's rainfall needs to be read and reported.

In the winter, snowfall depths and the actual water volume are requested. Depths can be measured using a yardstick. Water volume can be measured by catching the snow with the cap and small tube removed from the large tube. If snow is falling at 7 a.m., the snow can be placed in a pie pan or similar container for melting and the large tube can be returned to its mounting bracket. Once melted, the snow water can be poured into the small tube and recorded. In Colorado and some other states, volunteers are asked to set out 12 inch by 12 inch squares of Styrofoam covered with heavy-duty aluminum foil to measure hail size and intensity. Kansas observers are not asked to measure hail. The reporting form has space for comments regarding any observations, however. The data entry form also gives the opportunity to record the beginning and ending times of precipitation, the beginning and ending times of the heaviest precipitation, and whether any flooding is or was occurring.

CoCoRaHS Mission Statement

CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive Web site, our aim is to provide the highest quality data for natural resource, education and research applications.

The goals of the CoCoRaHS Network are:

1. To provide accurate high-quality precipitation data to observers, decision makers and other end-users on a timely basis.
2. To act as an umbrella for one-stop precipitation information nationwide. Their ambition is to increase the density of precipitation data available throughout the country by encouraging volunteer weather observing, as well as by collaborating with existing precipitation networks.
3. To increase community awareness about our weather by inspiring and encouraging citizens to participate in meteorological science and have fun doing so.
4. To provide enrichment activities in water and weather resources for teachers, educators and the community at large; thus, building a collective awareness of our climate and develop citizen's skills in scientific data collection.

If you can help CoCoRaHS meet these goals, consider volunteering. If you know someone who already measures rainfall, share this article. They may appreciate the opportunity to share information and be part of a group with similar interests.

To contact CoCoRaHS call 970/491-8545 (Mtn. time). E-mail is atinfo@cocorahs.org. To contact the local state coordinator direct your internet browser to http://www.cocorahs.org/Content.aspx?page=coord and select the state. Their mail address is: CoCoRaHS, Colorado State Univ., 1371 Campus Delivery, Fort Collins, CO 80523-1371.