

Backyard Weather Watchers

by Sue Gagliardi

CITIZEN SCIENTISTS MAKE A DIFFERENCE BY TRACKING RAIN, SNOW, AND HAIL.

In July 1997, a devastating flash flood hit part of Fort Collins, Colorado. Within 31 hours, a storm dumped over a foot of rain in a small area of the city near Spring Creek. Meanwhile, the rest of city had little rain. The local weather station, located just a handful of miles away from the Spring Creek area, measured only 2 inches (5 cm) of rain. Weather prediction maps and official observations didn't detect the huge amount of precipitation falling on this neighborhood in time. Because experts didn't have any information about the rainfall, they were slow to warn residents living near Spring Creek.

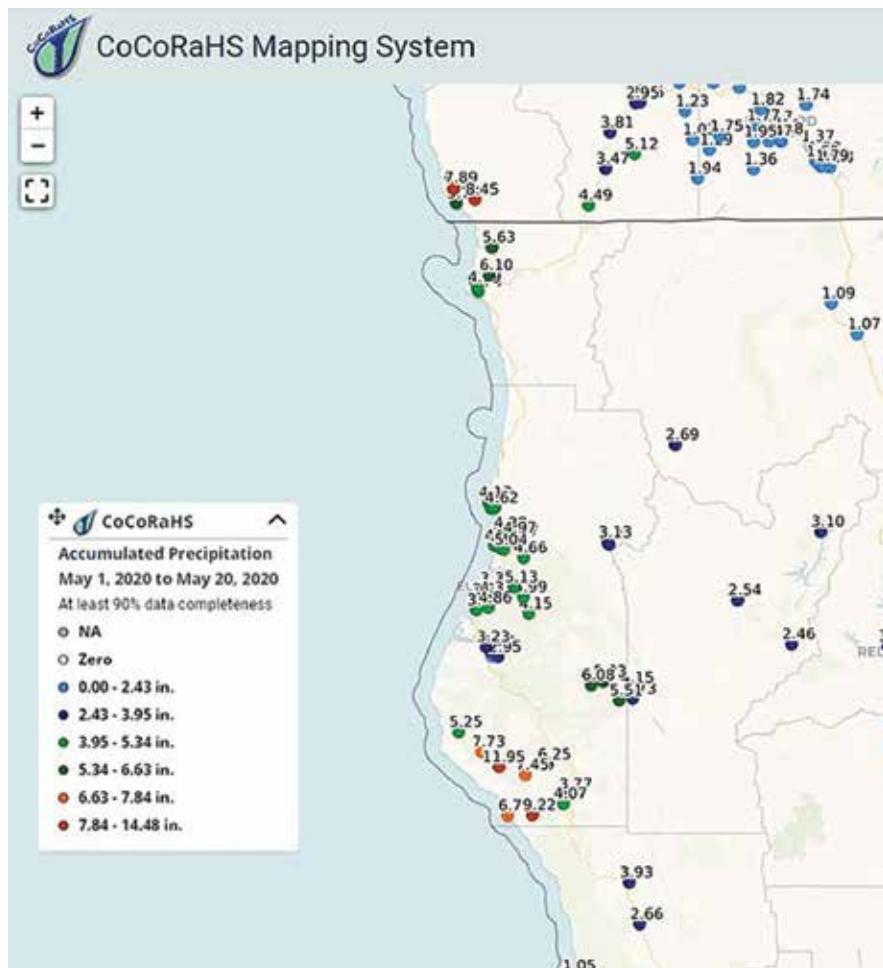


The heavy rainfall caused the creek to spill over its banks. The floodwaters created a raging path of destruction. A train was washed off its tracks. Homes, businesses, and parts of the Colorado State University campus took extensive damage. In a mobile home community, the water level surged to 5 feet (1.5 m) within minutes. Tragically, five people lost their lives in the flood.

CoCoRaHS Is Born

In response to this shocking flood, climatologist Nolan Doesken took action. He decided to find a way to get the rainfall measurements experts would need to predict a similar type of flood in the future. Doesken at that time was director at the Fort Collins Weather Station and the assistant state climatologist for the Colorado Climate Center. He realized that weather scientists had little information about wide differences in the amount of rainfall in local areas. So he asked ordinary people to help collect this information. Through Doesken's initiative, the Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) was born.

Founded in 1998, CoCoRaHS is a network of over 20,000 volunteers who collect data on their local weather. The volunteer network



includes weather watchers across the continental United States as well as in Canada, Puerto Rico, the US Virgin Islands, and the Bahamas. Who uses their data? Professionals who forecast the weather and water supply, researchers, and scientists. The National Weather Service uses

the data to predict weather patterns and events and to issue local weather warnings that help keep people and property safe. CoCoRaHS strives to provide better mapping and reporting of intense storms in local areas in real time, when the information is most critical.

Be a Backyard Weather Watcher

Sound important and interesting? You can help too! People of all ages can participate in real, hands-on science by measuring and reporting daily precipitation through CoCoRaHS. Visit the group's website with an adult to learn how to get started.

Recruiting lots of volunteers is a crucial part of monitoring precipitation because we all live on different spots on Earth's surface. When a volunteer from a new address joins, scientists can "see" precipitation in a place they would

HOW MUCH RAIN FELL NEAR YOU?

Have you ever noticed it raining on your side of the street while the other side stays sunny and dry? Believe it or not, the rainfall outside your home can differ from how much rain falls at your friend's place down the street. Even with all the high-tech weather instruments used to measure precipitation, meteorologists rely on citizen scientists to report the weather in their small corners of the world.

You can help by measuring the precipitation in your own backyard or balcony. Add to the fun by challenging your friends and family to a precipitation prediction contest! The more you estimate and check your predictions, the better you will hone your weather predicting skills.

CoCoRaHS founder Nolan Doesken shares how he and his son enjoyed backyard weather watching in the early days of CoCoRaHS.

"When CoCoRaHS first started, my son was 10 years old. We started a daily contest to see who could most accurately guess how much it had rained," says Doesken. "We guessed based on visual clues like pavement wetting, puddles, storm water runoff, mud, etc. Then we'd go check the gauge and tally our scores."

Doesken adds, "By the time he was 12, he could estimate daily rainfall with surprising accuracy—better than many, if not most, of my professional meteorological colleagues."

"We also really enjoy shoveling snow and, in the process of pushing and lifting, we love to estimate snow density and water content and then compare that with our measurements," says Doesken.

Doesken and his now-adult son still enjoy this challenge. "It's not exactly prediction," says Doesken, "... but it's close. Furthermore, it makes rain gauge-reading into a fun game."

Once you've collected and measured the precipitation near your home, you can put the rainwater to good use. Try using the rainwater to water plants and flowers or to fill a birdbath. What other uses can you find for the rainwater you collect?



not otherwise have access to—such as your backyard or the parking lot behind your apartment building! The precipitation data volunteers gather becomes more and more valuable as more and more people volunteer to be CoCoRaHS weather watchers.

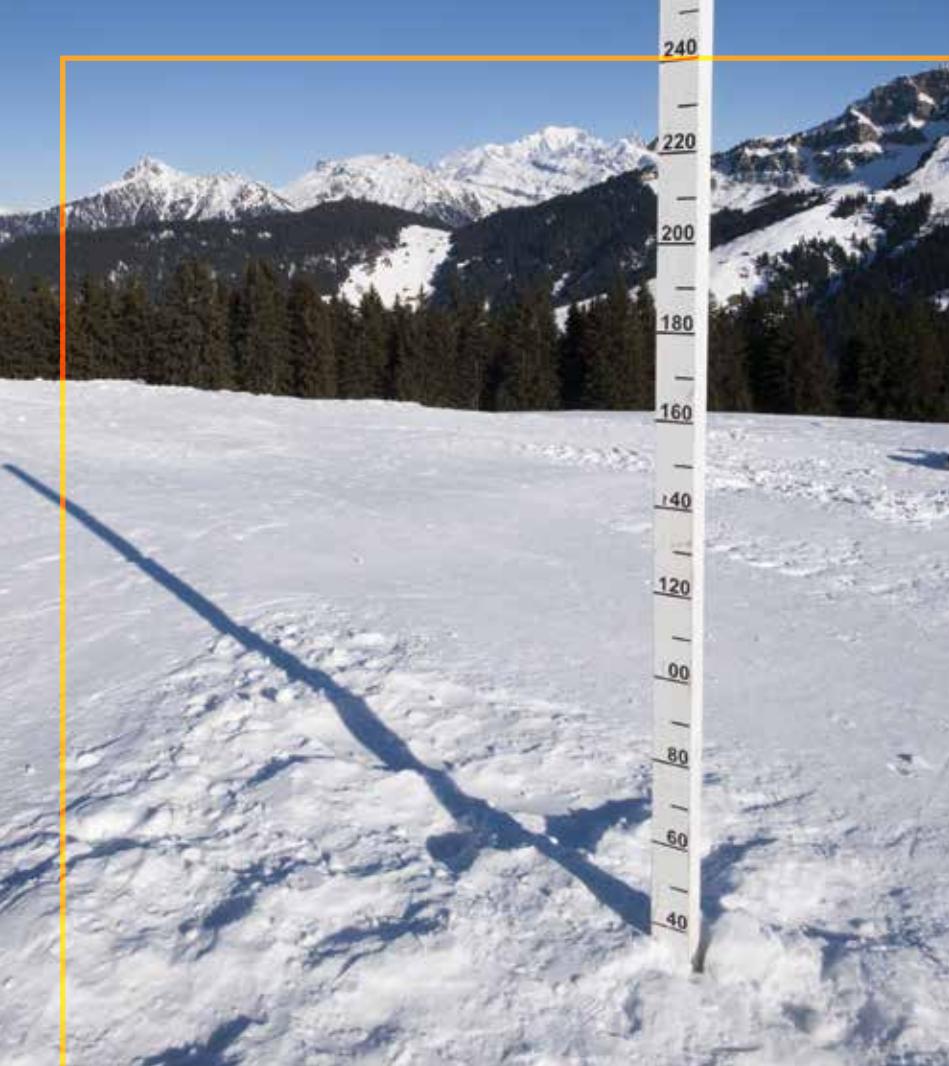
How Volunteers Collect CoCoRaHS Data

CoCoRaHS provides online training for people of all ages who want to become backyard weather watchers. Volunteers need a CoCoRaHS-approved rain gauge to get started.

CoCoRaHS rain gauges are plastic cylinders that collect rainwater. They consist of an outer cylinder and an inner measuring tube. Together these elements can measure up to 11 inches (28 cm) of precipitation. Volunteers mount their gauge on a post in their backyards.

By measuring rainfall with a rain gauge, volunteers contribute to a vast collection of weather data. Each CoCoRaHS volunteer enters their precipitation data into an online database at the same time each day. It gets mapped and analyzed immediately. If a huge blizzard or rainstorm happens, they report it in real time. This important information may not otherwise be available to scientists, weather forecasters, and many organizations. Experts use this data to predict weather patterns and issue local weather warnings.

What about when it's not raining? Volunteers report zero precipitation. Dry, sunny days are just as important as wet days for data collection. Long periods of zero rainfall can help organizations to assess areas on the



verge of drought. The National Drought Mitigation Center in Lincoln, Nebraska, and the US Department of Agriculture use CoCoRaHS data to assess drought conditions and the effects on crops.

Snow and Hail

There's more to measure than just rain! Snow measurements provide important data for the National Weather Service, public works departments, and scientists. CoCoRaHS weather watchers place a flat board on the ground before snowfall and then measure the depth of snow that falls onto it using a snow ruler or yardstick as soon as the snow stops.

Volunteers also measure the water content of the snow that collects in the rain gauge. To do this, volunteers remove the inner



cylinder before it snows. Then, as soon as it stops snowing, they melt the snow that fell into the larger outer cylinder by adding a premeasured amount of warm water. Subtracting the premeasured water amount from the total measurement reveals how much snowmelt they collected.

Volunteers in cold climates measure and report the amount of new snowfall and old snow on the ground each day.

In some states, CoCoRaHS volunteers also collect data on hail. Volunteers use hail pads—Styrofoam blocks covered with



thick aluminum foil—as surfaces to collect information during hailstorms. As hail hits the pad, it leaves indentations on the pad. These dents look a lot like craters on the moon and provide valuable data on the size and character of hail produced in the storm. NASA scientists review hail pads and CoCoRaHS data to determine the risk of hail at Kennedy Space Center. You can't launch a rocket in a hailstorm! Engineers consider hail pad data when designing hail-resistant airplanes. And some volunteers use leftover hail pads to create art with the help of nature.

20 Years and Growing

More than two decades after it began, CoCoRaHS continues to collect valuable weather data. “CoCoRaHS has now been around long enough that some of our original ‘kid’ participants now

have families of their own and are getting them involved,” Doesken says. “We have several examples of folks who started as children and now are professional meteorologists or in related fields.”

Joining CoCoRaHS with your family and friends is a fun way to help scientists every day! You can help this important organization

Try this experiment!



WATER IN THE CLOUDS

Ever wonder how much water is in a cloud?

Try this experiment to get an idea of how much water a cloud can hold.

You will need cotton balls, an eyedropper, and a small cup of water.

First, make a prediction of the number of drops of water you think the cotton ball can hold before the water begins to drip from the cotton ball.

Then hold the cotton ball over the cup of water. Fill the eyedropper with water. Use the eyedropper to add drops of water to the cotton ball. Count the drops as you add them.

Keep adding and counting the drops of water until the entire cotton ball is saturated, or full of water. You will know the cotton ball is saturated when you see water drip from the bottom. Record your results.

Try this several times with new cotton balls. Invite friends and family members to make predictions and try the experiment too.

Compare your predictions with the actual number of drops each cotton ball can hold. What do you notice? Are you surprised by your results?

Like the cotton balls, clouds can hold a tremendous amount of water. In a thunderstorm, the updraft, or rising column of air, may be extremely strong. Stronger updrafts can support a greater weight of water in a cloud. Once the weight of the water can no longer be supported by the updraft, the water falls as rain.

continue to grow. Being a part of CoCoRaHS is a big deal. Your backyard rainfall really matters.

Sue Gagliardi writes fiction, nonfiction, and poetry for children. She teaches 3rd grade and lives in Hatboro, Pennsylvania, with her husband and son. As a CoCoRaHS weather watcher, she wakes before dawn to measure the weather in her little corner of the world.

For more information and to become a CoCoRaHS volunteer weather watcher, visit cocorahs.org.