

COCORAHS (THE COMMUNITY COLLABORATIVE RAIN, HAIL AND SNOW NETWORK) — THE ACCIDENTAL NETWORK: EVOLVING COLLABORATIONS

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1. BACKGROUND AND HISTORY OF COCORAHS

CoCoRaHS (The Community Collaborative Rain, Hail and Snow Network), had an unplanned beginning following a devastating localized flash flood in Fort Collins, Colorado in July 1997. In the spring of 1998, a small project was initiated to involve the local community in tracking and reporting storms utilizing the Internet. The goal was to include local citizens in precipitation monitoring to increase their weather awareness while also providing timely precipitation data for decision makers. We did not want to be caught off guard by any future intense and localized storms.

With the help of local funding, three high school students from each of the three large high schools in Fort Collins were hired to work with the Colorado Climate Center to help set up and launch this project. One student developed a website that included data entry pages where volunteers could submit their reports. One student learned computer programming languages to create instantaneous local maps and data summaries from the rain and hail reports that volunteers would submit. A third student publicized the project and helped organize community outreach and volunteer training sessions. The project commenced in June 1998 after a few weeks of frantic work. Several dozen enthusiastic volunteers signed up and attended training sessions to learn how to measure and report rain and hail from their homes. Many of these first volunteers were motivated by vivid recollections of the recent flood. Each volunteer was equipped with a four-inch diameter high capacity plastic rain gauge for measuring rain and foil wrapped squares of Styrofoam for measuring hail (Figure 1.).



Figure 1. CoCoRaHS Rain Gauge and Hail Pad

In its' earliest days, CoCoRaHS was simply a Web-based method for collecting timely, useful and spatially detailed local rainfall and hail observations. It soon became apparent, however, that some participants were extremely interested in learning more about weather and climate while helping measure precipitation. Education and outreach grew in priority as means of engaging, motivating and retaining volunteers. We began hosting educational programs for our volunteers including seminars by local scientists and field trips to nearby weather research facilities. There was both direct educational value as well as community-building benefits from these activities. Now, ten years later, many of those early participants who attended those first educational programs have continued for nearly a full decade to help CoCoRaHS. Social and educational activities have been integral in maintaining such long-term volunteer commitments.

Thanks to the enthusiasm of the volunteers and the many benefits from having high resolution local precipitation data for climate monitoring, weather forecasting, and research, we began seeking additional support to expand the CoCoRaHS network to surrounding counties and communities. What has happened since 1998 has been a wonderful surprise. Starting with those first few dozen volunteers, the number of participants and the geographic bounds of the project have grown each year. In 1999 we added snowfall to our list of precipitation measurements so that volunteers could participate year round. Then in 2000 CoCoRaHS received a grant from the NSF

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Geoscience Education program to develop and implement educational content to accompany the project and to extend the reach to eastern Colorado. We participated in the multi-agency “Severe Thunderstorm Electrification and Precipitation Study” (STEPS) (Lang et al, 2005). At that time, more than 200 volunteers in Colorado were reporting precipitation on a regular basis. Data gathered in rural eastern Colorado proved very helpful to STEPS scientists. Dozens of these volunteers participated in additional educational activities including the first of several “Rocky Mountain Weather and Climate Workshops”. The National Weather Service and the U.S. Department of Agriculture, among others, became regular users of the data and began helping with outreach and training activities. High school students continued to play important roles in the early CoCoRaHS network including data analysts, volunteer recruiters and county level volunteer coordinators.

Since 2001, two major events combined to shape and define a larger future for CoCoRaHS. First, extreme drought in Colorado in 2002 looked like it could bring the project to an end. With long periods with no precipitation, volunteers felt useless and bored. But as drought continued and worsened, a new and critical role in monitoring the small-scale variations in drought began to take form. Water utilities, such as the Northern Colorado Water Conservancy and the Denver Water Department began to help sponsor CoCoRaHS as a means of gathering critical local information on available water supply and demand. Publicity associated with the drought, and many speaking opportunities across the state, brought much greater visibility to the project. In 2002, the first effort to recruit volunteers from the Denver area was begun followed by the first CoCoRaHS promotion to the mountain communities of Colorado. Surveys suggested that through participation in CoCoRaHS, some volunteers became much more keenly aware of the connection between climate and water supply and these were among the first in their neighborhoods to embrace water conservation strategies.

At about this same time (late 2002), CoCoRaHS was selected for funding by the National Science Foundation Informal Science Education program. For the first time, funds became available to hire a project webmaster and volunteer coordinator. In 2003, staff members were hired and an advisory board consisting of members from three adjacent Central Great Plains states was convened. CoCoRaHS became a

multi-state effort with high level advocacy. Educational resources were developed so that leaders in other states and in local counties could begin recruiting and training their own volunteers. With a CoCoRaHS webmaster in place, Web-based education tools became a major focus of the project. In 2006, CoCoRaHS was the recipient of one of NOAA’s Environmental Literacy grants encouraging outreach and partnership with NOAA offices across the country. Thanks to excellent relations with NOAA’s National Weather Service and their regional and local offices across the country, CoCoRaHS has recently grown from a several hundred active participants to well over 7,500 volunteers in 26+ states (Figure 2.). Since CoCoRaHS first began in 1998, more than 13,000 individuals and families from as young as preschool to as old as 90 have signed up to help. As we move into 2008, there is a waiting list for new states to join the network. In any given week, 50 to 150 new volunteers are registering online to help measure rain, hail and snow.

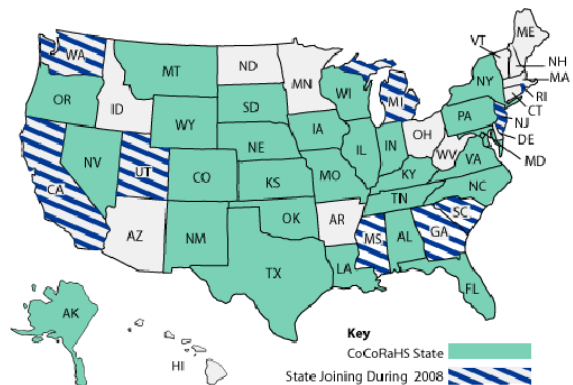


Figure 2. CoCoRaHS States, January 2008

We call CoCoRaHS the “Accidental Network” because we did not plan it in advance. When we started CoCoRaHS in northern Colorado, we did not envision that something so low tech and low cost as plastic rain gauges, Styrofoam hail pads and a diverse group of citizen volunteers would become widely popular and an important part of U.S. weather and climate monitoring and research. Perhaps we should have anticipated this. In every state and county there are individuals fascinated with weather and curious to learn more about why precipitation is so highly variable. The Internet makes it possible to gather and connect this diverse assortment of people into an effective collaborative data gathering and education program.

2. COCORAHS AND EDUCATION

In the early years of CoCoRaHS, education was a byproduct of a project designed primarily to collect data needed by scientists and decision makers. We have learned through time that CoCoRaHS works best when education is central to the project. Engaging volunteers as fellow scientists exploring geosciences together makes the basic process of measuring rain, hail and snow into an activity of continuous learning.

Based on evaluation work conducted while CoCoRaHS was funded by NSF's Informal Science Education program, we found that participant learning took place at several points and in several ways.

- 1) Learning how to measure and report precipitation accurately (class training session, one-on-one mentoring, and web-based instruction).
- 2) Learning about local climate and precipitation characteristics simply by taking measurements and recording data over time.
- 3) Learning from CoCoRaHS leaders—particularly via Webpage content and daily information messages that are sent back to each observer after they submit daily reports.
- 4) Learning by e-mail. Personalized messages are sent several times each month by the CoCoRaHS founder, Nolan Doesken, to all participants who have provided valid e-mail addresses (currently over 6,000). For those who take the time to read these messages, this was determined to be a significant source of learning and motivation as volunteers read about what scientists are observing and learning from CoCoRaHS volunteer data. Several state coordinators also send out messages to volunteers in their respective states with more specific content and feedback.
- 5) Learning by exploring CoCoRaHS maps and reports. A subset of participants routinely check CoCoRaHS precipitation maps and reports for other parts of the country. This provides the opportunity to independently learn about geographic variations in climate and precipitation patterns.

One very encouraging finding indicated that CoCoRaHS education reached beyond its immediate community of volunteers. An in-depth phone survey of randomly selected volunteers revealed that participants very active in CoCoRaHS measurements share their learning experiences with an average of 6-8 additional individuals (typically family member, neighbors and co-workers). This effectively increased the reach of CoCoRaHS approximately seven fold. CoCoRaHS has also benefited from print and broadcast media enamored by the low-tech public involvement. As CoCoRaHS has grown, there are newspaper, magazine, TV or Internet stories about CoCoRaHS and our findings almost every week, extending the reach of the project to the general public.

The most important factor affecting learning was participation. The more engaged a volunteer was, and the longer they participated, the more learning appeared to take place.

3. PARTNERSHIPS AND COLLABORATIONS

CoCoRaHS has been successful in reaching and engaging a large number of people of wide age and geographic ranges because of an ever-expanding ring of partners and collaborators who share a common interest in weather and climate information, science education or both. Only through motivated partners and collaborators at the state and local level has CoCoRaHS been able to expand so far so quickly.

Partnerships and collaborations have grown and evolved over time. The experiences in one state or area may or may not translate to other areas. It is informative to note and track the organizations who take the greatest interest in CoCoRaHS, but the combination of partners varies by state, as do recruiting strategies.

Up to now, the one partner organization most likely to take an active role is National Weather Service local forecast offices. Their primary motivation for participation is the need for accurate and timely weather precipitation measurements from as many locations as possible.

Here is a brief inventory, for selected states, of the partnerships and collaborations which have been used.

In Wyoming, the primary partners have been the University of Wyoming, the Wyoming Farm Service Agency and the National Weather Service.

In New Mexico, the lead partner has been New Mexico State University. Working through their Extension programs, they have successfully

targeted county Master Gardener organizations across the state to lead CoCoRaHS at a local level.

Indiana employed has employed a dual approach to CoCoRaHS leadership. The National Weather Service and the office of the State Climatologist at Purdue University have equally shared recruiting and training responsibilities and have often worked together, not separately.

In South Dakota, the State Climatologist is their CoCoRaHS State Coordinator. In addition to working closely with the National Weather Service forecast offices in SD, they have also very effectively engaged their County Extension personnel across the State in assisting with recruiting and training.

Tennessee has enjoyed some of the greatest successes in volunteer recruitment and participation. They invested time up front in establishing a variety of partnership, and have reaped benefits ever since. Their three National Weather Service forecast offices have taken lead roles but they have worked closely with University of Tennessee Cooperative Extension, Master Gardeners, Tennessee Farm Service Agency and the various Rural Electric Associations across the state.

Nebraska aggressively embraced the concept of CoCoRaHS but chose to set up their own website for data collection and display.

<http://dnrdata.dnr.ne.gov/NeRAIN/index.asp>.

Their very successful model has been to work almost entirely through their Department of Natural Resources and local multi-county natural resource districts (NRD).

These are only a few examples. Each participating state has a different combination of leading organizations and supporting partners. Success has varied from state to state. No single strategy or set of collaborators guarantees success. Successful programs, as determined by the number of active participants, have two things in common: enthusiastic leadership backed up with agencies support where collaborating organizations have a vested interest in better surface observation of precipitation.

Colorado, with the longest history of CoCoRaHS involvement, has developed the broadest base of partners and participants. Another "Accidental" part of CoCoRaHS has been the many partners and organizational collaborators that emerged unexpectedly. Many of these partnerships came about when enthusiastic individual volunteers participating in CoCoRaHS

happened to be employees of these organizations. They carried CoCoRaHS back to their employers and encouraged their participation. No other project in the 34-year history of the Colorado Climate Center at Colorado State University has developed or celebrated so many useful partnerships.

Examples of informal partnerships and collaborations that have increased CoCoRaHS participation, support and educational impact include:

- GLOBE, CSMATE, EARTHWORKS, UCAR, COMET and partnerships with other organized science education programs and projects such as the National Phenology Network
- School Districts
- Other Universities
- NOAA, National Weather Service
- NCAR
- Federal and State government agencies, especially those with land and resource management responsibilities
- Water and Power Utilities
- Cooperative Extension at the State and County level including 4-H and Master Gardener programs
- Watershed protection organizations
- TV stations
- Floodplain management and stormwater utilities
- Conservation Districts and USDA County Service Centers
- Resource Conservation and Development

After ten years of encouraging citizens of all ages to set up a rain gauge and report their rain and snow amounts, it continues to amaze us how useful this simple information becomes, how many purposes it serves, and how many organizations wish to be involved, and how many educational opportunities accompany this process.

4. THE FUTURE OF COCORAHS

Within the next two years, almost every state in the U.S. will become CoCoRaHS participants. By 2010 we expect to have over 20,000 active participants. At that rate, CoCoRaHS will be the greatest single source of ground observations of rain and snow data and the only source of its kind for hail information. As we grow to this point, partners and collaborators may be taking an even larger role in CoCoRaHS. As grant funding

becomes more difficult to obtain for such a large program national in scope, the burden of support is likely to shift from national to local. Local partners and collaborators may become an integral part of project support and funding as well as volunteer recruiting, training and data application.

CoCoRaHS may contribute to the new National Integrated Drought Information System (NIDIS). Sub-county scale climate monitoring, outreach and education, and partnership development are all aspects of CoCoRaHS that will compliment the immediate goals of NIDIS.

We have conducted thorough evaluation of the demographics of CoCoRaHS participants and the ways educational content is being delivered to participants. In the future, more in-depth evaluation is needed including evaluating what participants are learning and if and how it is affecting their lives, actions and choices.

Continued improvements to the Web site and the bolstering of resource support for both coordinators and volunteers are anticipated.

Through evolving partnerships and collaborations, the Community Collaborative Rain, Hail and Snow network will strive to improve climate literacy in the U.S. while also providing climate monitoring services that benefit our nation.

As with its beginnings the future for CoCoRaHS may hold some unanticipated surprises, perhaps even some "accidental" in nature. 7,500 volunteers in 2008 . . . in 1998 who would have dreamed of it?

5. ACKNOWLEDGEMENTS

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