

CoCoRaHS — Community Collaborative Rain, Hail and Snow Network: Citizen Scientists Track Precipitation

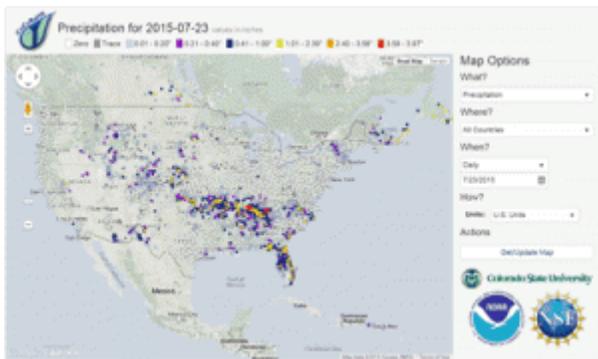
Case Study Overview

In 1997, following an evening of intense rainfall in parts of Fort Collins, Colorado, an ankle-deep creek running through Colorado State University became a raging river of mud and debris. The Spring Creek Flood left five people dead and city-wide damages of more than \$200 million — all for lack of warning. No one realized how much rain had fallen in the area, and traditional forecasting methods failed to predict such extreme flooding.



In response to the disaster, the Colorado Climate Center at Colorado State University launched a project to engage local citizens in collecting data on rainfall and other kinds of precipitation. The main goal of the *Community Collaborative Rain, Hail and Snow Network*, or *CoCoRaHS*, is to provide a way for volunteers to collect and submit local precipitation data and educate the public.

Project Description



Challenges

With volunteers in many different locations, ensuring data quality is a challenge. Volunteer coordinators and *CoCoRaHS* staff members monitor the maps and reports and are able to fix most errors. Also, *CoCoRaHS* volunteers are required to measure precipitation with standardized rain gauges with accuracy to the nearest hundredth of an inch. The cost is around \$35 for the rain gauge, discouraging participation by some potential volunteers.



Another challenge is volunteer retention. Because many citizen scientists are motivated by personal contact with scientists or project managers, *CoCoRaHS* encourages regional coordinators to reach out to volunteers on an individual basis; but this is not always realistic. Additionally, *CoCoRaHS* staff members regularly keep in touch with participants by social media, web posts and direct email.

Benefits and Outcomes

Observations made by volunteers are immediately available for public use on maps and in reports. By providing high-quality, accurate measurements, project participants supplement existing networks and provide useful data to scientists, resource managers, decisionmakers and others — all at a very modest cost.

Many different groups use data from *CoCoRaHS*. The National Weather Service uses *CoCoRaHS* data combined with information from government-managed networks, satellites and radar to create detailed daily precipitation maps. River forecast centers use the raw and mapped data to improve forecasts of both high and low flows on major rivers across the country, helping officials to predict floods, hydropower production and municipal water supplies. Participants in the National Integrated Drought Information System use *CoCoRaHS* in preparing the U.S. Drought Monitor. Agencies such as the U.S. Army Corps of Engineers use the data to refine estimates of “probable maximum precipitation” — information of importance in the design of dams and spillways. Farmers and the U.S. Department of Agriculture use *CoCoRaHS* data to evaluate crop conditions, anticipate market cycles and estimate irrigation requirements. Researchers use *CoCoRaHS* data for myriad peer-reviewed publications.

The project also provides a variety of learning opportunities. Through emails and newsletters, participants discover how their observations are used in meteorology, hydrology and other fields. *CoCoRaHS* has classroom resources for teachers, providing opportunities for students at all grade levels to participate in real science while meeting state and national standards in math, science, geography and more.

By joining a science project with a “local feel,” *CoCoRaHS* volunteers can develop a sense of community with fellow weather observers. They also become more aware of how the weather affects them, their neighbors, their region and the entire country.

Tips

The *CoCoRaHS* case study illustrates the following steps in the Federal Citizen Science and Crowdsourcing Toolkit:

- **Scope Out Your Problem — Know Your Objectives**
Focus on your core mission. *CoCoRaHS* focuses solely on manual measurements involving aspects of the water cycle.
- **Design a Project — Get Ready to Go**
Work with your actual and potential data users to develop protocols and data access methods. This will ensure that the data your volunteers collect can and will be used by others, which motivates participation and benefits the scientific community.
- **Build a Community — Know Your Community Partners**
Cultivate a group of local coordinators to help recruit, train and support participants. If the coordinators are also data users and project participants themselves, they can convey the value of the data and the importance of quality control, and they can understand the challenges that a volunteer might face in taking and submitting measurements. *CoCoRaHS* would have never grown to its current size without the continuous support of now over 300 state and regional coordinators.
- **Manage Your Data — Have a Data Management Plan**
Take advantage of the work that has been done by other citizen science organizations. In particular, the National Science Foundation's [Data Management Guide for Public Participation in Scientific Research](#) provides [best practices](#) for managing data in an iterative way throughout the data cycle.
- **Sustain and Improve Your Project — Communicate Effectively**
To sustain long-term engagement, give volunteers more than just access to project data. *CoCoRaHS* offers webinars led by professionals in related fields, newsletters and blogs of broad interest to volunteers.

Learn More

- Website: [Community Collaborative Rain, Hail and Snow Network](#)
- [CoCoRaHS Animations](#)
- [CoCoRaHS Data](#)
- [CoCoRaHS Map](#)
- [CoCoRaHS Training Slideshows](#)
- [DataOne Best Practices Database](#)
- [Data Management Guide for Public Participation in Scientific Research](#)

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