

Scientists turn to the streets for help in monitoring waterways

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This is a CrowdHydrology site in Michigan. Each site includes a giant measuring staff and a sign explaining how passersby can contribute to the project by texting water levels to scientists. Credit: CrowdHydrology

A project that asks hikers, fishermen, birdwatchers, school kids and nature-lovers of all stripes to monitor stream levels is expanding from its home base in Western New York to three new states: Iowa, Michigan

and Wisconsin.

CrowdHydrology was started in 2011 by Chris Lowry, PhD, a University at Buffalo assistant professor of geology. He came up with the idea after reading about a California researcher who used crowdsourcing to monitor roadkill.

"When I heard that this guy was actually getting people to send him info on [roadkill](#), I thought there's no reason I couldn't get people to send me info on how much water is flowing through streams," Lowry said in 2011 shortly after launching CrowdHydrology.

The project began with nine pilot locations in Western New York.

Each site is simple, consisting of a giant measuring staff and a sign explaining how passersby can contribute to CrowdHydrology by texting water levels and stream locations (identified by a station number) to researchers.

The U.S. Geological Survey (USGS) is supporting CrowdHydrology's expansion, giving Lowry and colleagues a grant to install stream gauges at about 10 additional sites in New York State; 20 apiece in Michigan and Wisconsin; and three in Iowa.

The project will help researchers track and understand the flow of water through a broad region, while engaging the public in science that matters in their daily lives.

This type of data collection is particularly important with tight budgets forcing USGS to discontinue the recording of water levels at many streams the agency has monitored for decades. Each of the new CrowdHydrology sites sits atop a glacial aquifer that provides much of the [drinking water](#) for Northern states.

"The USGS has a long history of measuring stream stages, but the equipment they use is very expensive. We need to find cheaper ways to do the same jobs we did in the past, and CrowdHydrology is one way to do this," said Lowry, who is partnering with USGS research hydrologist Michael Fienen on the project.

Future plans for CrowdHydrology include:

- Completing the current expansion. Sites are up and running in all four project states, but new installations will continue through the end of June.
- Designing a smartphone app that geolocates users. People sometimes forget to include their stream station location when they text CrowdHydrology. An app with geolocation abilities could do that automatically.
- Creating a do-it-yourself kit. The dream is to build a mail-order kit containing all the equipment needed for CrowdHydrology, so that K-12 teachers can install stream gauges on their own for use in class projects.

Whenever a citizen scientist texts CrowdHydrology, a computer program called Social.Water that Lowry and Fienen designed feeds the data to the project website, <http://crowdhydrology.org>, where anyone can view the information.

As CrowdHydrology grows, researchers are targeting locations like nature centers—places where visitors are already thinking about conservation, or where a staff member or other stakeholder is primed to make regular measurements.

At CrowdHydrology's nine New York pilot sites, Lowry found that high foot traffic didn't guarantee success. Gauges at popular trout-fishing spots received little data – a disappointment.

"We went with the assumption that passive crowdsourcing would be fine, but that didn't work," Lowry said.

What did work was a gauge he hammered into a pond at Beaver Meadow, a Buffalo Audubon Society nature preserve in Western New York.

Visitors there texted CrowdHydrology more than 100 times between May and November 2011, according to a 2012 paper by Lowry and Fienen in the journal Ground Water. The crowdsourced measurements were fairly accurate, roughly mirroring data from a mechanical gauge that the researchers installed for the purpose of double-checking for one month. Since November 2011, about 200 new texts have arrived from Beaver Meadow, Fienen said.

The numbers captured an unexpected phenomenon: beavers returning to dam up the pond after an absence of many years. The data showed [water levels](#) rising steadily

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http://crowdhydrology.geology.buffalo.edu/charts/NY1000_dygraph.html
l) in the first months of 2012 after the beavers' arrival, then dipping in November 2012 as the remnants of Hurricane Sandy ruined their dam, then reversing again as the animals made repairs, Lowry and Fienen said.

"The CrowdHydrology project is starting to fill in data gaps where we can't collect measurements as often as we would like. The fact that any passerby can contribute to the science is probably the greatest benefit," said Fienen, who works in the USGS Wisconsin Water Science Center.

Provided by University at Buffalo

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