

Tapping citizen scientists to test water quality can yield valuable data

2 June 2016, by Natalie Van Hoose



Indrajeet Chaubey, a professor of ecohydrology, tests water quality in Wildcat Creek, a tributary of the Wabash River. Credit: Purdue Agriculture/Tom Campbell

With a little training and simple equipment, members of the public can generate data that provides valuable insights into the health of local streams, a Purdue University study shows.

Twice a year, hundreds of volunteers participate in the Wabash Sampling Blitz, a [water-quality](#) monitoring program in central Indiana. Over four hours, they collect water samples from 206 sites within the region of the Great Bend of the Wabash River Watershed and assess the samples for temperature, pH, water cloudiness, levels of nutrient runoff and pathogen concentrations.

The Blitz proffers local watershed managers far more information about the water quality of the Wabash and its tributaries than they could gather on their own. But how valid is the data?

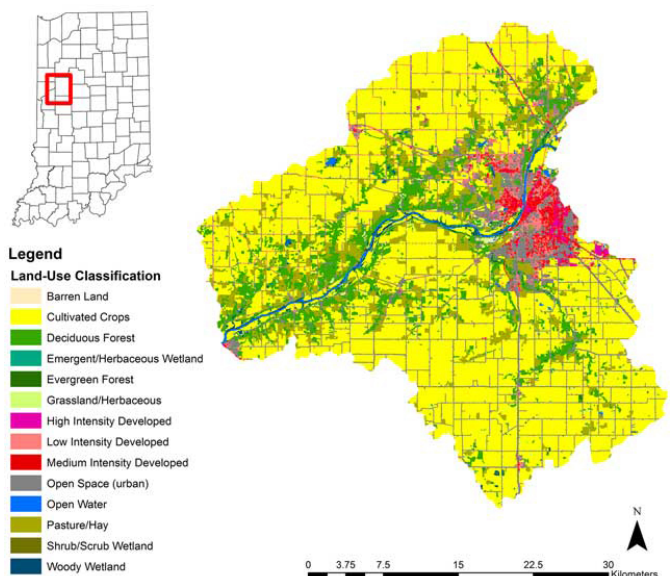
Purdue researchers found that Blitz volunteers proved consistently able to estimate nitrogen concentrations in the water with "moderate to substantial agreement to lab values," said Indrajeet

Chaubey, principal author of the study and professor of ecohydrology.

"Volunteers' analysis of nitrogen levels were directionally correct," he said. "When you hone in on exact numbers, the accuracy gets cloudier, but the values are generally true. This suggests that citizen scientists can provide meaningful and highly valuable data for watershed groups."

According to the U.S. Environmental Protection Agency, 52 percent of assessed streams in the U.S. have degraded water quality. Agricultural operations, in particular, can be sources of nitrogen, phosphorus and sediment, which can leach or drain off into waterways.

The majority of the land that drains to the Wabash River is used for row crop agriculture, and the watershed is also home to the urban areas of West Lafayette and Lafayette.



This graphic shows location and land use of the Great Bend of the Wabash River Watershed from the 2001 U.S. Geological Survey Land Cover Dataset. Credit: Muenich

et al.

Monitoring water quality can be a complex and costly undertaking, and capturing a glimpse of the entire Wabash watershed was far beyond capability of the staff of the Wabash River Enhancement Corp., a nonprofit agency that leads efforts to improve the river and its tributaries.

In 2009, WREC, partnering with Purdue researchers, created the Wabash Sampling Blitz to recruit, train and deploy community volunteers in a large-scale, simultaneous data collection effort. Volunteers travel to assigned sites in the watershed where they measure water transparency and temperature in stream and collect and assess [water samples](#) using field test strips that change color according to nutrient and contaminant concentrations.

"The impetus of the Blitz was the question 'What does water quality for the whole watershed look like?' " said study co-author Ron Turco, professor of soil microbiology. "We'd never seen the entire watershed in a six-hour period. The Blitz accomplishes that goal completely."

The Blitz acts as a screening tool, revealing "hot spots" in the watershed that could need more attention and effort.

While volunteer-analyzed nitrogen values were on par with laboratory-analyzed values, the results for orthophosphates, another group of nutrients, were spottier. Chaubey attributed this to the limits of the field test strips.

"Orthophosphates are generally very low in rivers, and the test strips are made to test for higher concentrations," he said.

The researchers emphasized that the value of community science efforts goes far beyond the data. The Blitz also helps the public understand the link between what happens in the landscape and how it affects local waterways, Chaubey said.

"The Blitz requires a lot of time, effort and

coordination, but the returns are tremendous: a snapshot of the entire [watershed](#), increased awareness of water quality issues and the opportunity to bring science to citizens and educate them on what they can do to protect water quality," he said.

More information: Rebecca Logsdon Muenich et al. The Wabash Sampling Blitz: A Study on the Effectiveness of Citizen Science, *Citizen Science: Theory and Practice*. (2016). [DOI: 10.5334/cstp.1](https://doi.org/10.5334/cstp.1)

Provided by Purdue University

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