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Citizen Science: Water Monitoring

Posted on January 8th, 2018
By Mikael Mulugeta

IIHR Research Engineer Chris Jones is recruiting public volunteers to participate in a new study that will measure nitrate levels in the Clear Creek and Middle Cedar watersheds. Participants in the project, titled Citizen Science: Water Monitoring, will use a smartphone application to detect nitrate levels using their phone’s camera.

Jones, along with IIHR collaborators Keith Schilling and Ibrahim Demir, conceived the idea two years ago, when researchers from Deltares, a Dutch water and subsurface research institute, visited IIHR—Hydrosience & Engineering (IIHR). The visiting researchers demonstrated their nitrate app on water samples from the Iowa and Des Moines rivers. Jones and Schilling thought the app had tremendous potential for fieldwork and wrote a proposal based on the tool for an EAGER grant (Early-Concept Grants For Exploratory Research) from the National Science Foundation.

After being awarded the nearly \$90,000 grant, Jones and Schilling began recruiting volunteers at Clear Creek and Middle Cedar Watershed Management Authority meetings. Currently, Jones has recruited 10 volunteers for Clear Creek, but still needs 50 volunteers for Middle Cedar. The Clear Creek project began just before the end of 2017; Jones hopes that the Middle Cedar group will begin in March or April of 2018.

How Does the App Work?

Volunteers dip paper test strips in the river or stream; the strips change color based on the level of nitrate exposure. A reference sheet indicates how each shade correlates to a particular nitrate level. For more precise readings, participants will place the strip on the reference sheet and then take a photo with the app, which quantifies the nitrate level to a tenth of a milligram. The app gives users a more precise reading than is possible with the human eye and downloads the data to the Deltares website with the GIS coordinates of the sample included. Volunteers using the tool can then access the website and see samples that they and others have uploaded.

Project Goals

The goals of the Citizen Science project include determining the app’s ability to accurately monitor water quality throughout a watershed, assessing user interest and engagement in using the app, and helping stakeholders identify “hot spots” for potential implementation of water-quality improvement projects. In addition, Jones’ team will evaluate the precision of the app’s results by comparing them to lab results for the same samples. They will also compare data gathered by volunteers to the data collected by the staff.

IIHR’s Ibrahim Demir plans to harvest the data from Deltares’ website and add it to the Iowa Water Quality Information System (IWQIS) website. IWQIS allows the public to track the nitrate levels of various Iowa rivers with data gathered by 70 sensors deployed throughout Iowa.

Why Track Nitrate Levels?

Nitrate is an EPA-regulated drinking water contaminant, and treated drinking water has a maximum level of 10 parts per million as nitrogen. Tracking nitrate levels in water sources is important because high nitrate levels in rivers can mean increased nitrate levels in treated drinking water. In addition, high levels of nutrients like nitrate and phosphorous can result in algae blooms in lakes and rivers that reduce biodiversity and make the water unsuitable for swimming and other recreation. On a larger scale, Iowa is trying to help reduce the size of the dead zone in the Gulf of Mexico by reducing the state’s contributions of nitrates to the Mississippi River. After algae blooms exploit high nitrate water in the Gulf, they die and consume oxygen. This reduces the level of dissolved oxygen in the water and creates a hypoxic zone that is unsuitable for fish, shrimp, and other aquatic organisms.



Tags: [Clear Creek](#), [Deltares](#), [IWQIS](#), [Middle Cedar](#), [nitrates](#), [Water Monitoring](#)