

# UT researchers work to avoid another water crisis

In 2014, the city of Toledo enacted its infamous water drinking ban when high amounts of a toxin released by harmful algal blooms was found in the water, and it was determined unfit for human consumption.

Three years later, this problem is still cause for much concern; with harmful algal bloom season coming up in June, researchers at the University of Toledo created an online database of algal bloom research as part of a state-wide research effort to find a solution.

In 2015, UT received \$66,000 from the Ohio Department of Higher Education to compile a research database and support harmful algal bloom research, said Patrick Lawrence, professor in the department of geography and planning, and associate dean of social and behavioral sciences in the College of Arts and Letters.

Lawrence and Karen Gallagher, a Ph.D. student in the spatially integrated social science program in the department of geography and planning, worked to create a database containing over 300 documents, publications and links with information including how algal blooms form and the public health consequences of the blooms, Lawrence said.

“Harmful Algal Blooms Information System, or HABSiS, is a site that stakeholders and community members can go to and get vetted information about the algal blooms,” Gallagher wrote. “People can use this website to educate themselves on public land use, how algal blooms form, the negative impacts of these blooms and what practices can minimize the prevalence of harmful algal blooms.”

HABSiS will need to be kept up-to-date with the latest

information, especially as new research and findings are released from universities and state agencies, Lawrence said.

Algal blooms are nothing new to Lake Erie and have grown in rivers and lakes across the world for millions of years, according to Lawrence. However, the world has seen an increased frequency of algal blooms for the past few decades in both salt and freshwater ecosystems.

“This type of algae releases a toxin called microcystin in very small amounts,” Lawrence said. “The World Health Organization declared this as a harmful toxin at 10 parts per billion and can cause severe liver problems in large doses.”

Even though this toxin was flagged as a dangerous substance, there has been very little research conducted of the effects it has on people and ecosystems where it is found in small quantities, Lawrence said.

One goal Ohio researchers have is to understand the short and long-term effects that small amounts of this toxin have on humans and animals.

“There are many forms of algae that are not harmful, but we have noticed an increase in one particular type of algal bloom that is responsible for the 2014 crisis,” Lawrence said.

If harmful algal blooms go unresolved, public and environmental health could be put at risk, but so could the economic futures of businesses that thrive on Lake Erie.

“The other side to blooms is the public perception. Blooms are ugly, and the water looks like green paint, so that would turn a lot of people away from visiting the lake and doing recreational activities,” Lawrence said. “This is a multi-billion-dollar industry that could fold up because people would rather pack up and take their money elsewhere.”

Funding has also paved the way for improved algal bloom

measuring and tracking that Lake Erie communities lacked during the 2014 crisis. This means that water treatment facilities, the city and researchers have more time to respond accordingly, Lawrence said.

“Removing the bloom from the water is very difficult; it’s not like an oil slick that can be skimmed off the surface. Instead, they are like filaments that can move around the lake,” Lawrence said.

There are a variety of factors that go into the formation of harmful algal blooms, but the most concerning factor for researchers is the runoff of excess nutrients from farmland and cities, Lawrence said.

“Farmers use manure and fertilizers to help increase yields, so what we need to ask is, ‘How do you apply these nutrients? How much do you apply it? And where you do you apply it?’” Lawrence said. “These are all practices that need to change and could reduce the amount of nutrients that make it to the lake and rivers.”

This strategy of starving algal blooms won’t stop bloom growth, but it will prevent them from growing large enough to cause any problems, Lawrence said.

“The toxin can be removed from the water via treatment plants and chemicals, but it is much harder to remove it from lakes and rivers. So that takes us back to the question, ‘How can we prevent algal blooms?’”

However, before any of these solutions can be implemented, Ohio researchers will need to measure the associated costs and give that information to the affected stakeholders, agencies and residents, Lawrence said.

“There are many options as to how we deal with this problem and some that involve changing behaviors and land use,” Lawrence said. “So we want to communicate to stakeholders and

encourage an informed dialogue and ask, 'What does the science tell us, and what do we do with that information?'"