

Environmental Updates

June 2019

Designed for use with the Global Development And Environment Institute's
Environmental and Natural Resource Economics textbook

The State of U.S. Drinking Water

In 2014 the city of Flint, Michigan switched their primary water drinking source from the Detroit water system to the Flint River. Though the Flint River itself was not contaminated with lead, its water was highly corrosive and was not properly treated before entering into the city's water system, which caused lead from water supply pipes to leach into the drinking water.

Soon after this water source switch, an increased number of young children in Flint started testing positive for severely elevated levels of lead in their blood. Lead is a heavy metal neurotoxin and is especially detrimental to young children as it can cause developmental delays and other negative health impacts. According to the U.S. Environmental Protection Agency (EPA), "the best available science shows there is no safe level of exposure to lead." The EPA requires that communities take corrective action if more than 10% of tap water samples exceed a "lead action level" of 15 parts per billion.

This incident, now referred to as the Flint water crisis, was not properly handled by local government officials, who initially denied any lead issues; and has yet to be resolved, with criminal investigations continuing and many Flint residents still relying on bottled water. It has gained wide attention as a leading issue of environmental justice, since Flint is a low-income community, with an African-American majority and 45% of its residents below the poverty line. The Michigan Civil Rights Commission, a state-established body, concluded that the poor governmental response to the Flint crisis was a "result of systemic racism."

Lead in drinking water poses a widespread threat. Major cities including Newark, New York City, Chicago, Detroit, Baltimore and Milwaukee have all found lead in their drinking water, as have 37% of schools across the US that have conducted lead testing.

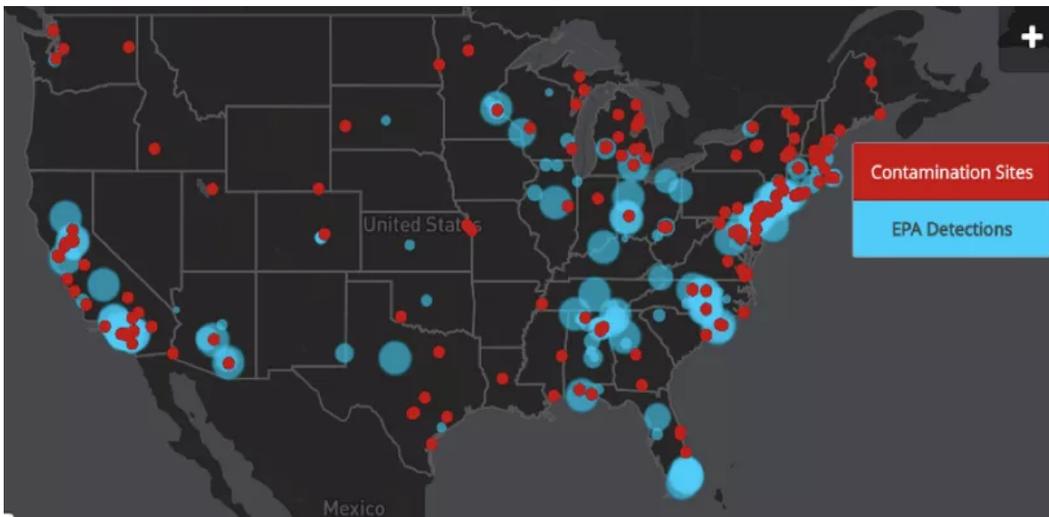
Around the same time that the Flint water crisis was unfolding, high levels of perfluorooctanoic acid (PFOA) were found in wells in the Upstate

New York village of Hoosick Falls, the former site of a Saint-Gobain Performance Plastics plant. PFOAs are used primarily to produce Teflon non-stick pans. These contaminants were first discovered in Hoosick Falls in 2014 after a local resident who had lost his father, a former Saint-Gobain employee, to cancer began researching Teflon and PFOAs. After conducting his own water testing and finding elevated PFOA levels, he brought the results to the mayor's office, prompting a larger investigation. Though there is still limited evidence about health effects, the International Agency for Research on Cancer (IARC), a part of the World Health Organization (WHO), has classified PFOA as "possibly carcinogenic to humans." Researchers have found higher than typical incidences of cancer, ulcerative colitis, thyroid disease, and pregnancy induced hypertension in Hoosick Falls and surrounding cities and towns that have been exposed to PFOA in their drinking water.

PFOA and similar chemicals, Perfluorooctanesulfonic acid (PFOS) which is used as a stain repellent and fabric

protectant, is now being found in water supplies across the U.S. In the summer of 2018 the city of Parchment, Michigan found levels of PFOA and PFOS in their water 20 times higher than the EPA's health advisory level for those chemicals, causing the declaration of a state of emergency. Sites of PFOA and PFOA contamination (which are jointly referred to as PFAS, or per- and polyfluoroalkyl substances), are now popping up across the country. Communities near military bases are particularly at risk to due high chemical use and poor disposal practices on military installations. A 2016 study by the Harvard School of Public Health found that more than 6 million people in the U.S. were drinking water with unsafe levels of PFAS chemicals. The map in Figure 1, created by Environmental Working Group and Northeastern University shows PFAS contamination sites in red, and sites where EPA tap water detection has

Figure 1: PFAS Contamination Across the U.S



Source: EWG and SSEHRI, (2018)

found elevated PFAS in blue. As of 2018 there were 94 PFAS pollution sites in 22 states.

Incidents like the Flint water crisis and the Hoosick falls PFOA case have brought to light the fact that many residents across the U.S. are exposed to chemicals and other contaminants in their water. A major study of U.S. water quality published in 2018 found that as many as 21 million people may be drinking water that does not meet health-based quality standards for contaminants including fecal coliform, arsenic, lead, copper, disinfection by-products, radionuclides, and other chemicals (Allaire, Wu, and Lall, 2018). Rural communities especially often struggle to meet drinking water standards. The map in Figure 2 shows the number of water quality violations per community for the 2004-2015 time period.

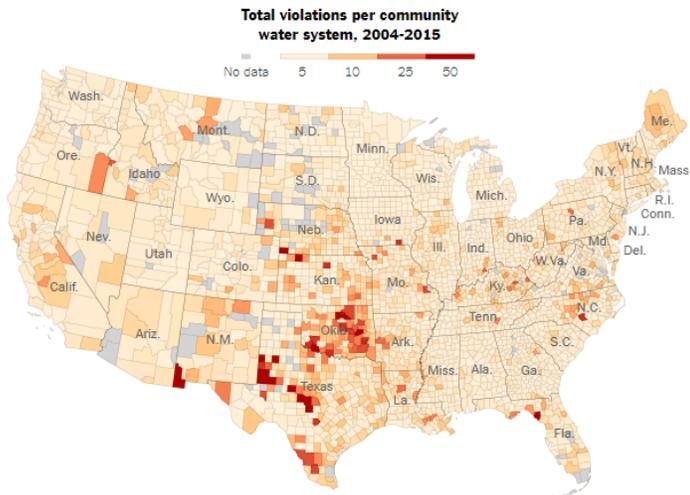
In the United States, all public water supplies are regulated by the Safe Drinking Water Act (SDWA). Under the SDWA, the EPA sets drinking

water standards and works to implement programs to ensure water meets these standards. The SDWA was signed into legislation in 1974 and is believed to be responsible for steady improvements in water quality in the past 45 years.

Although the EPA sets water standards and has oversight on water quality, states are primarily responsible for implementing and enforcing water treatment, with each state carrying out their own public water supply supervision (PWSS) Program.

The 1972 Clean Water Act (CWA) also regulates discharges of pollutants into the waters of the United States and sets quality standards for surface waters. One of the challenges with enforcing this act was that it was not clear which bodies of water fell under its jurisdiction. To address this, the Obama Administration published the 2015 Clean Water Rule (also referred to as Waters of the US, or WOTUS). This rule states that all bodies of water in the U.S. that fall under federal jurisdiction, including streams and wetlands, fall under Clean Water Act regulation. The protected bodies make up about 60% of the country's bodies of water, and contribute to drinking water sources for 1/3 of the country. The Clean Water Rule has been implemented in 22 states, with the remaining 28 having blocked its implementation through lawsuits.

Figure 2: Water Quality Violations across the U.S.



Source: Plumer & Popovich, 2018

The Trump administration EPA has proposed revisions to this rule that would weaken its protections by exempting wetlands that do not connect to larger bodies of water, and streams and tributaries that do not run year-round. Weakening the rule is popular among some rural farmers, as well as real estate developers and golf course owners, as it would exempt the bodies of water on their lands from regulation. The changes proposed by the Trump administration will likely be decided upon in 2019.

Cleaning up drinking water in the U.S. will require a combination of

regulation, water treatment, and infrastructure replacement and repairs. Lead in water primarily comes from lead leaching into the water from lead pipes, or lead solder from pipe joints. The Reduction of Lead in Drinking Water Act, implemented in 2014, prohibits the use of pipes, plumbing fittings, fixtures, solder and flux that contain more than 0.25% lead as a weighted average. From 1986 to 2014, up to 8% lead was allowed; prior to this, lead was mostly unregulated in plumbing, and many city water systems still rely on lead pipe systems. Replacing city water infrastructure is a large, and expensive undertaking, which means that corrosion prevention is an important alternative for preventing lead contamination. This can involve either the addition of chemicals which create a barrier between pipes and

water, or changing the water pH or hardness.

PFOA and PFOS are no longer used in manufacturing in the U.S., but these chemicals can still make their way into U.S. water sources through imported products, or through lingering contamination in soil and water sources near previous manufacturing sites. These chemicals can be removed with proper water filtration or treatment, so water quality monitoring and testing is an important first step in reducing human consumption.

Although the recent water crises in the US have been devastating to the communities impacted, they have been important in bringing these issues of drinking water contamination to light. This has prompted residents and advocacy groups to push for increased water quality testing, stricter standards, and appropriate treatment measures to help improve water quality across the country. State and local action will be central in a period when the national EPA is generally moving to relax regulations.

This update specifically relates to *Environmental and Natural Resource Economics: A Contemporary Approach* Chapter 20. For more information about the books, teaching materials, and research, see www.gdae.org

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