

## INFRASTRUCTURE INJURES (MC1)

### What's the problem?

An issue in many communities is a lack of access to clean and fresh water. A large component of this struggle comes from outdated and damaged water infrastructure. In many cases, lead and other pollutants can seep into the water from aging pipes, which causes damage to the nervous system, kidneys, red blood cells and pregnancies. Three examples of this can be seen in Flint, Michigan, Vine City, Georgia, and Buffalo, New York.

#### Flint, Michigan

In April 2014, contaminated water was pumped into thousands of homes in Flint, Michigan. After switching to pipes coming from Flint River instead of Lake Huron, the acidity of the water was also switched. The water corroded the lead-filled pipes and caused rashes, illnesses and even death. Many children's development was stunted because their bodies couldn't

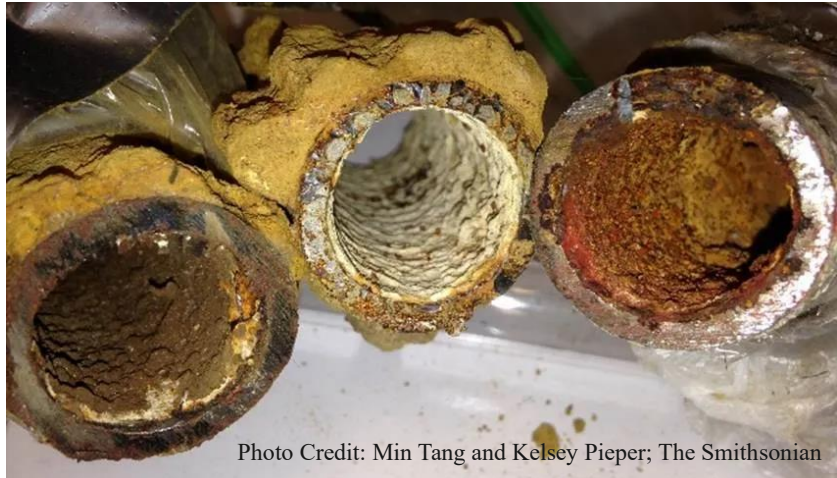


Photo Credit: Min Tang and Kelsey Pieper; The Smithsonian

defend themselves against lead poisoning. While the pipes were eventually switched back to the ones from Lake Huron, the damage was already done. Not only was the water distributed to homes across the city of Flint, but to hospitals, senior living homes, and other places where immunocompromised people were staying. They were particularly affected because of their increased risk of getting legionella pneumonia, a severe type of pneumonia that can lead to respiratory failure and septic shock.



Photo Credit: Tyson Paul / WXIA; 11 Alive

#### Vine City, Georgia

In June 2024, a water junction in Vine City, Atlanta burst, leaving many people in the city without clean or safe water for almost a week. The junction couldn't handle the large amounts of water going into the city of Atlanta, causing it to burst and begin to flood the streets. Residents of Vine City and the surrounding areas were then put under a

boil advisory to avoid contamination, but many stores and restaurants were put out of business for multiple days. While the breakage was eventually fixed, the risks of lead and other contaminants getting

into the waterways and the risk of another burst, are still high because the pipes are so outdated they can't support the amount of water the cities need.

### Buffalo, New York

Around 64% of houses in Buffalo, New York have pipes that are over 80 years old, causing masses of lead to infiltrate the water (Greenfield). This causes many of the citizens to have exposure to lead poisoning. Multiple families in Buffalo know that their water is contaminated but, in many cases, they can't do much about it because they're already struggling as is. Though the city has plans to

address the thousands of contaminated pipes, there isn't much to be done for those, especially children and the elderly, who have already been exposed for years.

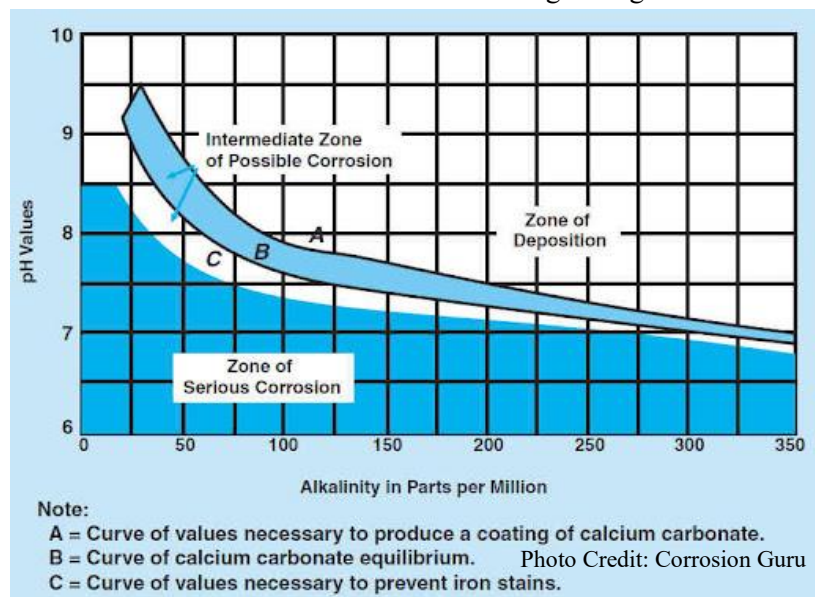


Photo Credit: Spectrum News 1

### How is it “wicked”?

Now, the damaged and outdated water infrastructure is already a problem, but how is it a wicked problem? A wicked problem can be defined as a problem in a community or communities that has six main characteristics: a vague problem definition, an undefined solution, no endpoint, irreversible, unique, and urgent.

In different cities, the issues aren't necessarily because the pipes are outdated. It can be that they're too small, too big, or contaminated. The issue could also be that the water flowing through the pipes is either too basic or too acidic. There isn't one definition to the problem because it's different in every place. This also means that there is an undefined solution. If the problem can't even be put into words, how are people meant to solve it. If the pipes are outdated, the city could just replace them, right? However, not only will this take years of manual labor and consistent road work, but the damage has also already been done to the surrounding communities. It's the same for contaminated pipes and water with pH differences.



The more acidic the water, the more corrosive it gets, causing lead, copper, and other parts of the pipe's coating to contaminate the water

There isn't an endpoint to the water infrastructure problem because even as the pipes get fixed or replaced, eventually they are going to age, causing the whole problem to start over again. In addition, the reason that so many contaminated water lines have gone undetected is because they are in lower-income areas and areas where the majority of the residents are people of color. The governments of these areas are usually run by white supremacists who believe that if it's not directly affecting them, then they have no need to fix it. For this to be remedied, a stance needs to be taken against systematic racism and discrimination but unfortunately, it's highly unlikely that it will ever be completely wiped out.

Not only is the damage that has already been done to people irreversible but attempts to fix the problem are also irreversible. Because of the amount of labor, money and time that would go into consistently replacing and fixing waterlines, there isn't a stopping point. If people stop midway and just leave it as is, then there are half-repaired pipes in the roads and communities which become a bigger problem than the one already at hand. Many of the damages are also unique to the area in which they occur. In Flint, the reason that lead was able to seep into the water was because the pipes were aging and because the water coming from Flint River was acidic enough to erode the casing of the pipes. However, in Atlanta, the pipes burst because the large amounts of water overfilled the pipes, and they couldn't handle the increased pressure. The problem is never the same in any two places and is always changing and evolving.

This problem needs to be addressed urgently because it is actively affecting children, elderly, immunocompromised individuals, and more. According to the World Health Organization (WHO), lead poisoning can lead to damage of the brain and central nervous system, cardiovascular disease, and a multitude of kidney diseases. Something needs to be done to progress past this wicked problem and set the world on a path to getting through it.

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