# ACTOR NETWORK THEORY ANALYSIS OF WATER CRISES IN LOW-INCOME, **UNITED STATES CITIES**

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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## **Introduction: Fable of Tomorrow**

It is like a dystopian novel. A powerful leader tells his subjects that everything is fine as they struggle to survive under the unjust reign of a totalitarian regime. The rich, the people in power, live in luxury: clean, running water, electricity, nice roads, and beautiful skyscrapers. Most people live in unmaintained cities and when problems, like contaminated water, occur, leaders turn a blind eye and offer diaphanous solutions. In this world, most people are simply the masses; there, but without substance. Their lives and well-being are relatively unimportant. In some parts of the world, this is a reality. Perhaps this is an exaggeration for the United States' future, but there is little residents of Flint and Newark can do about their failing infrastructure without the assistance of the government. It is not as though they can replace the pipelines themselves and many of them do not have the wealth to relocate. These people are trapped in cities without a vital resource: clean water.

These water crises highlight the greater issue of corruption within the United States' governmental system. At the heart of the issue is inequality rampant within this country. Money is power in the United States. With money, you have more opportunity for increasing your assets, the ability to live in areas with decent infrastructure, and the ability to invest in candidates running for positions in government. This positive feedback only serves to quiet those in poverty and allow the affluent to scream louder than anyone else. It has created a breeding ground for corrupt politicians who serve the interests of rich lobbyists, rather than the interests of the majority of their constituents, who will turn a blind eye to failing infrastructure and the struggles of the working class to support the interests of their high-paying donors.

Every single person in the United States should care about this issue because it is one of equality and justice. We live in a system that enables the already-wealthy and further drains the

working class. We must struggle with governmental officials who serve their own interests rather than the interests of the citizens they are meant to serve. Flint and Newark are only two miniscule points, two instances, on a much larger map of the government serving the interests of a few individuals rather than the people they are meant to serve and empower. By understanding how the federal, state, local governments, and other actors interact with citizens of the United States, I hope to be able to shed light on fundamental flaws with the way actors with influence and power, like the government and national media corporations, treat issues faced by the working class.

## Introduction: Corrosion, an invisible challenge to public health

The International Measures of Prevention, Application and Economics of Corrosion Technology (IMPACT) study completed by National Association of Corrosion Engineers (NACE) International states that roughly 2.5 trillion USD, 3.4% of the world's gross domestic product, is spent annually on corrosion (2016, para.2). Corrosion has a human cost as well; collapsing infrastructure, aircraft crashes due to corroded parts, and contaminated water all play a part in killing, injuring, and spreading illness among people. Corrosion in the piping and operating equipment of the Union Carbide India Limited pesticide plant in Bhopal, India caused methyl isocyanate gas to leak out of the plant and into the atmosphere. Approximately 800,000 people were exposed to the toxic gas; of those people, 3,800 died immediately (Broughton, 2005, p.1). While the Bhopal incident is a more extreme case, many corrosion related incidents result in deaths and were completely preventable had the proper precautions been taken.

In the US, corrosion has raised significant challenge to public health. The leadcontaminated water in Flint, Michigan drew the eye of everyone in the United States to the problem many lower-class, American communities face: failing water-transportation infrastructure. However, the several-year stretch of time it took for any form of solution and the lack of one today reveals a much more nuanced issue. The residents of Flint must face problems about communication with their local government and the federal government.

This thesis will focus on water pipeline corrosion-related issues within the United States and how they affect the dynamic between residents of the areas of study and the local government along with other actors. The following research questions will be addressed:

- Why and how does lead/metal contamination in drinking water disproportionally impact low-income communities within the United States?
- 2. How do these crises impact the community and the people individually? What are the social, economic, and political impacts of water contamination in low-income communities?
- 3. What role do the government and media play in these crises?

## **Literature Review**

The Flint case is not merely an accident, but grounded in a long history of water infrastructure building in American. In the early 1900s, state and local governments sanctioned networks of lead pipes to be built for transporting water to homes and buildings within their respective cities (Lewis, 1985). Jack Lewis, Assistant Editor of the Environmental Protection Agency (EPA) Journal, wrote in his 1985 article that the use of lead in pipelines dated back to Roman times and it was chosen because of its "suitability as inexpensive and reliable piping for the vast network plumbing," although lead was suspected to be toxic at this time, engineers made the decision to use lead due to its toughness (para.5). The problem comes in when water is introduced, especially if that water has corrosive elements in it, such as fluoride and chloride ions (Scott, 2018, p.2). Governmental officials can prevent many of these cases of lead contamination in water by maintaining infrastructure and properly monitoring the lead levels in relevant homes. Unfortunately, even after becoming aware of extraordinarily high lead levels in their cities' drinking water, officials denied that the water was unsafe and did not allocate tax dollars to finding a solution until the problem developed into a catastrophe (Venkataraman, 2018, pp.8-10).

Flint, Michigan is only one in many cases of water crises due to governmental negligence. Corrosion is often an afterthought for many officials and the people responsible for making decisions about the water treatment process do not assess the consequences of their choices thoroughly. The discovery of corrosion in water pipelines in Newark, New Jersey unfolded similarly to Flint, Michigan (Leyden, 2018a). Officials neglected to inform the public of any problems of which officials were aware and continuously insisted that everything was safe (Leyden, 2018b). According to Liz Leyden (2018b), a reporter for the New York Times:

For nearly a year and a half after high lead levels were first discovered in the water system, Mayor Ras Baraka and other officials blamed aging lead pipes, insisting on the city's website that the water was "absolutely safe to drink". (p.1)

This quotation raises the questions: how exactly do local governments of a cities affected by corroding pipelines manage the resulting problems? How do the state and federal governments respond? Who else is involved and who has the most power to solve the issues at hand?

Local governments, the second most influential group, play a significant role in these crises while the federal government tends to play a smaller role. However, the federal government is responsible for setting and enforcing water quality standards via the EPA. The lack of involvement of the federal government in repairing corroding infrastructure and regulating local governments harms the residents of the affected communities. Advocacy groups tend to provide temporary solutions, such as bottled water, and a voice for affected citizens, but they are unable to provide a permanent solution, like replacing the lead pipes. This permanent solution is the responsibility of the local, state, and federal government because they are employed by the people and to serve the people. News outlets, first local and then national, play an indispensable role in spreading awareness of these problems, specifically that of governmental negligence. They helped to further empower the residents living in these communities. However, the government is still ultimately responsible for finding a permanent solution to the corroding pipelines.

These water pipelines give the government power over the people because this technology is necessary for people to survive. Often, there is not a second option for community members, other than buying expensive bottled water, so the government can charge what it desires for water. When the pipelines began to corrode in both Flint and Newark, releasing large amounts of lead into the drinking water, the local governments still required that people pay their water bills (Leyden, 2018b). While these pipelines were built with lead to increase their longevity, they ended up hurting the user. Because many of the citizens in cities affected by failing infrastructure are in the lower-class, they often lack the resources to influence government or find alternative solutions when the government is not meeting their needs (Gleason, 2019, pp.412-413). Advocacy groups further helped mitigate the problem by pointing out the unfairness and inequality the problem presented and by providing resources for the people in the community (Day, 2019, p.359).

## **STS Framework & Research Method**

The tangled relationship among public health, regulation and water infrastructure, can best be portrayed using the Actor Network Theory (ANT) (Latour, 2005). ANT describes the networks created between actors involved in a specific technology and how actants are used to mediate and change these networks, or relationships.

This thesis adopts ANT to analyze the way local governments handle corrosion problems in low-income communities like Newark and Flint, and discuss potential solutions to corrosion monitoring and reporting in older cities with lead pipelines. The actors include: the citizens of the affected areas, the local, state, and federal governments, news and media organizations, engineers and scientists who test the water and who study the causes of the problems, the pipelines themselves, advocacy groups, the Environmental Protection Agency (EPA), and the employees responsible for maintaining water quality standards.

Case studies of the water crisis in Flint, Michigan and Newark, New Jersey will be explored. My main source of data will come from document analysis, including the analysis of local newspapers, articles, pictures, and videos made my people within the communities of interest. I want to understand how these events have impacted the lives of people in the communities. Officials, such as the mayors of Flint and Newark, have been interviewed extensively by news organizations like PBS, the New York Times, and the Washington Post. However, it is important to hear from the community members, especially because most of them are displeased with their local governments' handling of the crises.

## **Data Analysis**

#### Newark, New Jersey Water Crisis

In a 2019 City Hall, Dr. Wade, the director of the Department of Health and Wellness for the city of Newark, stated that "...by far, by far, by far, the greatest reason for having elevated lead levels in children, is not from drinking water that could have lead, but from paint chips, from dust, from lead on clothing, from playing in the dirt." This is only one instance during which members of the panel removed blame from themselves and placed it on non-actors, things out of their control, like clothing or not having the data to know that the corrosion control in Newark was not working. The audience appeared to respond positively to all of these attempts to redistribute the blame for the water crisis.

In a 2019 City Hall meeting, Ras Baraka seemed well received by the crowd, who cheered loudly when he was introduced (NJTV News, 2019). He announced that \$120 million had been secured from Essex County to replace the pipelines and that legislation had been passed to replace lead pipelines without the permission of homeowners (2019). He stated that he would "never concede" that he "let families have lead in their homes without informing them." He stated that 39,000 water filters had been purchased to hand out to Newark residents for free and noted several other measures he took to help the people of Newark through this crisis (2019). It seemed as though, for most of the time Mayor Baraka spoke, it was to remove blame from himself. He even seemed to downplay the issue of lead contamination in the city, stating that the houses tested in Newark showed no signs of lead exceedance until 2017. He stated, "I live here," implying that the problem was personal, even though later in his address to Newark he stated that not every home had elevated lead levels in their water (2019).

An article by The New York Times titled, "Tainted Water, Ignored Warnings and a Boss with a Criminal Past", published on August 24, 2019, seems to primarily target people living outside of Newark with the intention to inform them about updates in the Newark Water crisis (Corasaniti, 2019). The authors are very critical of Mayor Ras Baraka, the mayor of Newark, as are several other officials. It explicitly places blame on Mayor Baraka for downplaying the elevated lead levels in the water. Arguably, the most important point made in the article is, "City officials brushed aside warnings and allowed the system to deteriorate, while state and federal regulators often did not intervene forcefully enough to help prevent the crisis." This sentiment is echoed in nearly every article written by national media outlets like PBS, The Washington Post, and The New York Times, about these lead contamination crises.

The purpose of this article is to highlight the mistakes made by Mayor Baraka and how those mistakes led to the water crisis faced by Newark today. According to the authors, Baraka knew that the water had been contaminated with lead but still told his constituents that the water was fine. A Virginia Tech engineering professor stated that acidic water, which causes the leaching of lead into the water, "had been in the Newark system for quite some time," based on data. One thing of note is the lack of motivation Mayor Baraka seems to have for not addressing or attempting to mitigate the crisis as soon as possible. While many of these articles are critical of Baraka, none of them address why he would ignore the crisis in the first place (Corasaniti, 2019).

## Flint, Michigan Water Crisis

Rick Snyder, the former governor of Michigan, is widely believed to be the person responsible for the Flint water crisis. After his election to office in 2010, Snyder expanded the powers of emergency managers who can intervene in governmental decisions in an effort to save money (Goodin-Smith, 2018). In 2011, when the state of Michigan took over Flint's budget, it was suggested that to save money, Flint should switch from Detroit's water system to Flint River, which was supposed to be a temporary solution. However, Flint River's water was found to be highly corrosive and despite this, the system was switched, using Flint River as the source (Yan, 2017).

A class action lawsuit against the city of Flint, filed in 2016, was greenlighted by the US Supreme Court in January 2020. Jeneyah McDonald, a resident of Flint, stated in a video interview, "'Who cares?' That's what was said. 'Who cares is only Flint.' I don't feel like that would have happened in Lancy. I don't feel like that would've happened in Grand Rapids or Kalamazoo..." (TODAY, 2019). These Michigan cities are predominantly white and much wealthier than Flint. Many other residents echo the same sentiment, including the former Mayor of Flint, Dr. Karen Weaver (2019). Despite the switch back to Detroit water, the pipelines are still corroded and are still being replaced. Residents of Flint must budget for bottled water and the consequences of drinking contaminated water on their health.

Dr. Marc Edwards, a researcher from Virginia Tech, was credited with being a whistleblower about the severity of the lead contamination in the water (Stein, 2019). Most importantly, he identified the Flint River, the new water source, as the source of the problem. After the local government told many people who complained about their water that it was caused by their plumbing, essentially removing the blame from the government, Dr. Edwards investigated these claims by testing the Flint water. The scientific community has played a role in informing residents about the crisis, shedding light on its severity and the health effects of lead poisoning, when the government remained silent in an attempt to hide the issue from their residents.

Currently, the city, including staff at the water treatment plant claim that the water is safe to drink again. However, many residents disagree and Dr. Edwards believes that lead levels are still too high (TODAY, 2019). Scientists and engineers who helped him test Flint's water to reveal the state government's lies about the source of the lead contamination, suggest that he is exaggerating these claims. Regardless, in many interviews residents have stated that they still do not believe the water is safe.

## Discussion: The broken network of water crisis management

There are several types of technologies and actors to investigate within these corrosion crises. From the data collected, it seems as though, while the cases of Newark and Flint began similarly, the local governments in both cases interacted differently with their constituents. The mayor of Newark, Ras Baraka, was much more effective at recruiting the residents, using lead filters and handing out bottled water, than officials in Flint. In addition, he secured \$120 million from Essex County to replace the pipelines in residents' homes and legislation to replace pipelines in private property without the owner's permission, thus recruiting everyone in the city.

Initially, just as issues with Flint and Newark became more evident, the residents trusted the administration and continued to use the contaminated water. Different factors caused people to turn against the administration, including visual evidence of contaminated water (Flint) and testing by independent organizations or individuals. The scale of the lead crisis in Newark was only fully realized because of independent testing. These testing kits removed people from the user group of both city's pipelines, placing pressure on local and state governments to provide bottled water and lead filters. From research, it appears this was more effective in Newark than in Flint due to the severity of the Flint crisis.

Media outlets and news corporations, especially national news, play a major role in these crises by informing outsiders and bringing new actors into the network. It is safe to state that a majority of national news coverage has been in favor of the residents of Flint and Newark and anti-local and state government. The New York Times and Washington Post have both heavily criticized the role the local governments played in covering up and down playing the lead-contamination in the water and their lack of action to help the residents of their respective cities. In both cases, these news outlets placed blame on local and state officials for the crises. The governor of Michigan, Rick Snyder hired an emergency manager to cut costs, which resulted in the city drawing water from the Flint River as the main pipeline was connected to the new water supply. The choice to draw water from the Flint River was made in spite of concerns of its cleanliness. In Newark, the mayor was aware of two tests for lead in the water supply that were significantly over the standard. In both cases, the residents of the cities were not immediately informed. Instead of framing the stories as accidents, these national news outlets placed blame on specific people, like Ras Baraka and Rick Snyder.

The crisis in Flint led to several lawsuits being filed against the federal government and officials involved in the crisis. Outside actors, specifically activist groups, have played an essential role in holding the government responsible for its negligence. The same group, the Natural Resources Defense Center (NRDC), that helped the residents of sue the federal government, plans to assist residents and groups within Newark do the same to Newark's local

government (Clauser, 2019). The NRDC is an actor within this network which is acting to hold the government responsible.

The residents of the city and the EPA, who sets standards for the appropriate concentrations of toxic chemicals in water, first notice the problem and consult the local and state governments of the affected community. The governments should then consult civil and corrosion engineers who prototype and test solutions to the problem which is then reviewed by a group of residents who are informed about the issue. The informed residents discuss the ramifications of implementing the solution provided by the engineers and present their findings to the local government. The local government should then decide the best course of action and employ the workers needed to solve the problem for the local community. The problem people in these lower-income communities face is the engineering and discussion steps are missing from the process when the local government attempts to find solutions. This will provide lines of communication between residents, and the local government and engineers. Doing so will increase the power of the residents to choose a solution, rather than the local government bearing all of the responsibility to do so.

## Conclusion

Lead-contamination of drinking water usually only occurs in lower-income areas, like Flint and Newark, which have 45% and 28% poverty rates, respectively (Data USA, n.d.). These issues usually occur due to the age of the infrastructure and/or because of the negligence of people in charge in corrosion control. In both Newark and Flint, local administration failed to test an adequate and representative sample of residents. In addition, the choices made in Flint

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and Newark to not inform their residents in a timely manner and not act accordingly further aggravated the crises.

While steps have been taken by governmental officials from all levels of government to mitigate these crises, the root issue is not being addressed by the government. The failing infrastructure is a major problem; however, arguably, poor choices made by administration is a more significant issue. Governmental officials lack incentive to listen to their constituents and environmental agencies because a) they may not be personally affected by the choices they are making, and b) money/budget is a larger issue for them than the residents of the city. Therefore, there is no simple method for solving this deeper societal problem. NGOs and volunteer organizations give agency to citizens seeking to contend with the false claims made by the local and state governments about the quality of the water. Lawsuits and water testing kits provided by volunteer groups in the beginnings of the crises can be effective ways to hold governmental officials accountable. However, they are not always successful at doing so and they are reactive actions, rather than proactive. Many citizens of Flint and Newark expressed frustration that the crises occurred at all and that they would not have occurred if these cities were rich and predominantly white.

Environmental injustice is a serious problem experienced by many people across the globe, ranging from these water crises to the Bhopal Incident. Unfortunately, there is no simple fix for deeply embedded corruption because it is convenient for most people. For example, millions of tax dollars from federal and state governments will have to be reallocated to Flint and Newark in order to replace all of the pipelines and provide monetary aid to residents affected by the lead contamination. Most people in the United States are not putting pressure on the federal government to help regulate infrastructure failures and hold state and local officials accountable

unless they are directly impacted by the issue. Therefore, the government, at all levels, has little incentive to remedy local crises more than assisting with a temporary solution. Successful lawsuits against the cities, states, and officials involved in the Flint crisis are a step in the right direction. The United States Supreme Court's acknowledgement of Rick Snyder's corruption indicates that there is a possibility he will be held accountable. Perhaps, these lawsuits will pave the way for eventual proactive measures that ensure honesty on the part of governmental officials.

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