

HARVEY: ENVIRONMENTAL JUSTICE AND LAW

*Andrea Giampetro-Meyer** & *Nancy Kubasek***

“Disasters provide moments in which fractures and inequalities in society are exposed for all to see.”¹

“The true injustice of Harvey is that many of the people who have lost their homes and lives to Harvey are the same people who have had to live with the environmental degradation, polluted water and toxic air from the oil and gas refineries along the Gulf Coast.”²

INTRODUCTION

August 25, 2019 commemorated the second anniversary of Hurricane Harvey.³ It also marked the biennial of the start of the worst ever flood-producing storm in the United States.⁴ On August 25, 2017 Harvey hit Houston and southeast Texas first as a Category 4

* Professor of Law & Social Responsibility, Loyola University Maryland.

** Professor of Business Law, Bowling Green State University.

¹ GORDON WALKER, ENVIRONMENTAL JUSTICE—CONCEPTS, EVIDENCE AND POLITICS (2012). Walker’s contribution to the theory and practice of environmental justice highlights different justice concepts, and how these forms of justice play out in real situations such as Hurricane Katrina and its aftermath.

² Rebecca Anderson, *Hurricane Harvey: Ground Zero for Climate Justice*, THE ACE BLOG (August 29, 2017), <http://acespace.org/2017/08/29/hurricane-harvey-ground-zero-for-climate-justice/>. Anderson points out that some communities “are caught in a cycle of climate injustice, hit first with the plague of fossil fuel development in their backyards, and second by the carbon pollution that causes climate change-fueled disasters like Harvey.”

³ Eric Berger, *Harvey: This is probably the worst US flood storm ever; I’ll never be the same*, SPACE CITY WEATHER (Aug. 25, 2018) (reprinted from August 25, 2017), <https://spacecityweather.com/harvey-almost-certainly-the-biggest-us-flood-storm-of-all-time/>; see also *2017 Hurricane Harvey*, WORLD VISION <https://www.worldvision.org/disaster-relief-news-stories/2017-hurricane-harvey-facts>. Harvey was the second most costly hurricane to hit the mainland. Katrina in 2005 was the costliest. The death toll from the storm was 88. The death toll was low because the flooding was slow—it happened over several days. People were able to evacuate.

⁴ Berger, *supra* note 3.

hurricane⁵ and continued with extreme tropical rainfall that dropped 30 to 50 inches of rain on the region over five days.⁶ The rain triggered unprecedented flash and river flooding.⁷ This flooding damaged and destroyed homes and businesses, leaving some residents unable to get to work, or unemployed.⁸ The storm and its aftermath challenged residents' physical and emotional well-being.⁹

Harvey's first anniversary in 2018 provided an opportunity for residents, nonprofit organizations, and government officials to take stock of the recovery. Harvey displaced 30,000 people and damaged or destroyed over 200,000 homes and businesses.¹⁰ One year after the storm, eight percent of the people Harvey impacted were still unable

⁵ Sandra Brown, *The Long Road to Recovery: Response and Rebuilding after Hurricane Harvey*, 81 TEX. B.J. 242 (2018). In some areas, Harvey's winds were close to 130 miles per hour.

⁶ Berger, *supra* note 3.

⁷ Michael Kimmelman, *Lessons from Hurricane Harvey: Houston's Struggle is America's Tale*, N.Y. TIMES (Nov. 11, 2017), <http://www.nytimes.com/interactive/2017/11/11/climate/houston-flooding-climate.html>.

⁸ A. Mechele Dickerson, *Hurricane Harvey and the Houston Housing Market*, 96 TEX. L. REV. ONLINE 102 (2018). Dickerson points out that renters, black, and Latinos were hard hit by Harvey. Workers could not get to work because their cars flooded, roads were impassable, or because their employers closed. Residents who could not get to work suffered income insecurity. Dickerson also points out that wealthier neighborhoods enjoyed better infrastructure, which meant water receded quickly and caused less mold damage than lower-income neighborhoods experience. Lower-income neighborhoods' flood control systems are often ditches. These ditches overflowed, and water accumulated in homes. Finally, Dickerson points out that Houston officials built much of the city's affordable and subsidized housing in designated flood zones.

⁹ Berger, *supra* note 3. Berger points out that, for many people in Houston, Harvey will be a defining event in their lives; *see also* Isabella Masini, *Hurricane Harvey's Impact on Texas' Vulnerable Population*, 28 ANNALS HEALTH L. ADVANCE DIRECTIVE 165, 168-75 (2018). Masini states that "[n]atural disasters disproportionately affected those who are in a lower socio-economic bracket." She points out that low-income communities are also flood-prone areas near industrial facilities. Residents are unlikely to have insurance. They cannot repair their homes. They lack access to health care. Low-income residents are exposed to mold and additional hazardous substances. They are likely to suffer from asthma, chronic respiratory illnesses, gastrointestinal and skin infections, diabetes-related complications, cardiovascular disease, depression, anxiety, and posttraumatic stress disorder.

¹⁰ Masini, *supra* note 9.

to return to their homes.¹¹ Fifteen percent of the homes damaged by the storm were still unlivable.¹² Resource-rich communities returned to normal relatively quickly, while communities of color and low-income communities were still a mess one year later.¹³

Harvey's second anniversary presents an opportunity for legal scholars to engage in discernment about environmental justice and law. This discernment is important because it comes at a time when researchers are starting to release information about the links between contaminants dislodged by the storm and their effects on human health.¹⁴ In a climate change era, Harvey is likely to be one of several historic disasters that threaten the homes, livelihoods and lives of many, especially vulnerable residents of communities who already live with pollution and its effects. The purpose of this article is to examine Harvey, environmental justice, and federal and state law with the goal of finding ways to prepare citizens for future superstorms.

The Article proceeds in three parts. Part I describes Harvey and the post-hurricane rain and floods the storm triggered. This section then studies Harvey as an environmental justice narrative. Part II describes three key federal environmental statutes Congress enacted over thirty years ago and explores them in the Harvey context. This

¹¹ Brandon Formby, *In Harvey's Wake*, TEXAS TRIBUNE (Aug. 23, 2018), <http://www.texastribune.org/series/in-harveys-wake/>. The Kaiser Family Foundation and the Episcopal Health Foundation surveyed 1,651 people from 24 counties. Twenty-three percent said that Harvey worsened their financial situation and 17 percent said it lowered their quality of life. Among black Texans impacted by the storm, 60 percent said they are not getting the help they need. Forty percent of Hispanic respondents and 33 percent of white respondents were not getting needed help.

¹² *Id.*

¹³ Danny Vinik, *'People Just Give Up': Low-Income Hurricane Victims Slam Federal Relief Programs*, POLITICO (May 29, 2018), <http://www.politico.com/story/2018/05/29/houston-hurricane-harvey-fema-597912> (Vinik highlights residents' lack of insurance and lack of awareness of FEMA rules. He also points out that language issues, bureaucracy, and contractor fraud made low-income residents give up.); *see also* Alexander C. Kaufman, *Houston Flooding Always Hits Poor, Non-White Neighborhoods Hardest*, HUFFINGTON POST (Aug. 29, 2017), https://www.huffpost.com/entry/houston-harvey-environmental-justice_n_59a41c90e4b06d67e3390993.

¹⁴ Christopher Flavelle, *'Toxic Stew' Stirred Up by Disasters Poses Long-Term Danger, New Findings Show*, N.Y. TIMES (July 15, 2019), <http://www.nytimes.com/2019/07/15/climate/flooding-chemicals-health-research.html>.

section then examines and evaluates relevant state laws from the states most likely to experience hurricanes followed by flooding. Parts I and II tee up Part III, which offers concrete suggestions to promote positive change for vulnerable residents during and after extreme weather events. The Article ultimately contributes to conversations about how to empower communities to assert their rights before the next storm hits.¹⁵

I. HARVEY AND ENVIRONMENTAL JUSTICE

A. *Harvey*

Houston is a large,¹⁶ low-lying,¹⁷ sprawling¹⁸ city known for its lack of zoning regulations.¹⁹ The city has long favored business development over neighborhoods and people.²⁰ Houston is also America's petrochemical hub,²¹ with more than 450 plants and refineries sharing neighborhoods with Houstonians.²² These plants and refineries are well-known polluters that expose residents to a wide range of toxins and carcinogens.

In August 2017, Hurricane Harvey swept in off the Gulf of Mexico to dump 24.5 trillion gallons of rainwater across Houston and southeast Texas.²³ Although a hurricane is a naturally occurring phenomenon, human-caused climate change can affect a storm's

¹⁵ *Environmental & Climate Justice*, NAACP, <http://www.naacp.org/issues/environmental-justice/>.

¹⁶ Houston is America's fourth largest city.

¹⁷ Houston lies a few dozen feet above sea level. Berger, *supra* note 3.

¹⁸ The Houston metropolitan area is 665 square miles.

¹⁹ Kimmelman, *supra* note 7.

²⁰ William Fulton, *Houston: From Sprawl to City*, GOVERNING (Feb. 2015), <https://www.governing.com/columns/urban-notebook/gov-houston-sprawl-city.html>.

²¹ Jen Kirby, *The Environmental Fallout of Hurricane Harvey*, N.Y. MAG. (Sept. 2, 2017), <http://nymag.com/daily/intelligencer/2017/09/the-environmental-fallout-of-hurricane-harvey.html>.

²² *Id.*

²³ Rafael Aldon, *Hurricane Harvey InsurTech Case Study: Visual Intelligence is Transforming Claim Response Times*, TOWARDS DATA SCIENCE (Sept. 19, 2017), <http://towardsdatascience.com/hurricane-harvey-insurtech-case-study-visual-intelligence-is-transforming-claim-response-times-3275042fbd8d>.

intensity.²⁴ Scientists have explained Harvey's extraordinary rainfall by pointing out that Harvey stalled over Houston and southeast Texas for several days. The storm stalled because climate change created atmospheric conditions that stopped the storm from moving out of the area.²⁵

When rain falls in Houston, it should run into streams and rivers, through Galveston Bay, and ultimately to the Gulf of Mexico. With Harvey, rain fell so hard and fast that it created new rivers that washed over everything in their paths, spreading contamination from raw sewage and toxins.²⁶ Polluted rivers became lakes that settled on neighborhoods.²⁷ The Federal Emergency Management Agency ("FEMA") reported that nearly 80,000 homes had at least 18 inches of floodwater, and 23,000 of those had more than five feet.²⁸ Harvey's trail of devastation was exacerbated by the U.S. Army Corps of Engineers' decision to release water from two Houston area reservoirs on August 28th.²⁹ The federal government designed these reservoirs, the Addicks and Barker, to protect downtown Houston.³⁰ Both dams feed into the Buffalo Bayou, a slow-moving river that flows through the Houston Ship Channel into Galveston Bay and the Gulf of Mexico. When engineers eased pressure from the reservoirs by releasing rainwater, their action to protect downtown Houston caused flooding

²⁴ Berger, *supra* note 3. Berger says that "the moderately warmer-than-normal Gulf of Mexico, almost certainly exacerbated the effects of the storm."

²⁵ *Id.* In particular, with Harvey, a large low-pressure system moved into the Texas coast. This system brought significant moisture with it. Typically, when tropical storms become hurricanes, they have the ability to forge a steering current. Harvey was different. The storm collided with a ridge of high pressure and blocked the storm from moving.

²⁶ Michael D. Regan, *Health Concerns Swirl in Texas Months After Harvey Spread Toxic Waste*, PBS NEWSHOUR (Dec. 10, 2017), <http://www.pbs.org/newshour/nation/health-concerns-swirl-in-texas-months-after-floods-from-harvey-spread-toxic-waste>.

²⁷ *Id.*

²⁸ News Release, Fed. Emergency Mgmt. Agency, *Historic Disaster Response to Hurricane Harvey in Texas*, Sept. 22, 2017, available at <https://www.fema.gov/news-release/2017/09/22/historic-disaster-response-hurricane-harvey-texas>. For an overview of what FEMA does, see Dan Farber, *How Disaster Response Works*, LEGAL PLANET (Aug. 29, 2017), <http://legal-planet.org/2017/08/29/femas-role-in-disaster-response-its-not-what-you-think/>.

²⁹ Berger, *supra* note 3.

³⁰ *Id.*

in homes that would not have flooded but for the release.³¹ Many residents were surprised, angered, and alarmed not only by the flooding itself,³² but also because they did not have flood insurance.³³ Some residents had no idea that their homes were flood-prone, so they never considered the need for flood insurance.³⁴

B. *Environmental Justice*

Although Houston is one of the most racially diverse³⁵ cities in the United States, at the neighborhood level, the city is stubbornly racially segregated.³⁶ Although racial segregation in housing is illegal today,³⁷ historic segregation still affects where Houstonians live now.

³¹ *Id.* Berger points out that the Corps did not have good options. If the dam walls had failed, the Houston area would have experienced a release of a wall of water as much as 100 feet high.

³² Juan A. Lozano, *Trial to determine if government liable for Harvey flooding*, AP NEWS (May 6, 2019), <http://www.apnews.com/99f32a9b746b45d4a92e694a7f9aec68>. Some people did not know their property lies inside reservoir boundaries. Most of the time, the land behind the dams looks like park land. Lozano points out that, “around the reservoirs, located about 20 miles west of downtown Houston, more than 10,000 properties flooded. A portion of the land is on private property.”

³³ Dickerson, *supra* note 8. Homeowners lacked flood insurance for a number of reasons. It is expensive. Flood zone maps were outdated and/or inaccurate. Moreover, developers, realtors, and/or lenders told homeowners they did not need the insurance.

³⁴ *Id.*

³⁵ According to the U.S. Census 2000, the racial makeup of the city was 49.3% White, 25.3% Black or African American, 0.4% Native American, 5.3% Asian, 0.2% Pacific Islander, 16.5% from other races, and 3.2% from two or more races; additionally, 37% of the population was Hispanic or Latino of any race. Since the 1990 Census, Houston's population has become majority-minority. *Profile of General Demographic Characteristics: 2000, Houston Texas*, U.S. CENSUS BUREAU, https://factfinder.census.gov/bkmk/table/1.0/en/DEC/00_SF1/DPI/1600000US4835000.

³⁶ John Henneberger, *Houston, It's Time to Stop Accommodating Segregation*, SHELTERFORCE (Feb. 7, 2017), <http://shelterforce.org/2017/02/07/houston-its-time-to-stop-accommodating-segregation/>.

³⁷ Kelly Haragan, *Environmental Justice and the Anniversary of Hurricane Harvey*, TEX. L. NEWS (Sept. 4, 2018), <http://law.utexas.edu/news/2018/09/04/environmental-justice-and-the-anniversary-of-hurricane-harvey/>.

In the past, before Congress passed civil rights laws, government actors told citizens of color where they could purchase homes.³⁸ Once neighborhoods were racially segregated, industries decided to place plants in low-income and communities of color.³⁹ Once toxic industries moved into specific neighborhoods, demand for housing, as well as home prices, declined. Residents who live in these neighborhoods cannot afford to move.⁴⁰

Environmental justice is a movement⁴¹ that calls attention to inequalities low-income and communities of color experience with regard to the environment.⁴² This movement also urges policymakers to ensure that polluting industries pay the costs of the pollution they generate, rather than pass these costs to communities and taxpayers.⁴³ Climate justice⁴⁴ extends the environmental justice movement,

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ For a history of the environmental justice movement in the United States, see Jedediah Purdy, *The Long Environmental Justice Movement*, 44 *ECOLOGY L.Q.* 809 (2018) (documenting the movement's thirty-year history); see also Christopher Ibrahim, *Environmental Justice as a Growing Movement: A Look at United States Domestic Policies and Efforts to Address Environmental Burdens on Lower-Income Communities*, 18 *GEO. ENVTL. L. REV. ONLINE* 1 (Apr. 20, 2018) (highlighting state legislation and task forces focusing on environmental justice issues).

⁴² Haragan, *supra* note 37. See also WALKER, *supra* note 1, at 148. Walker breaks down three forms of justice--distributive, procedural, and justice as recognition. Distributive justice highlights the distributions of goods and bads (e.g., those losing jobs were predominantly poor and black). Procedural justice refers to access to information, participation in decision-making (e.g., the lack of information on toxicity risks from flood water). Justice as recognition means patterns of respect, stigmatization, discrimination (e.g., the racist history of housing development in the city).

⁴³ *Id.*

⁴⁴ See HENRY SHUE, *CLIMATE JUSTICE—VULNERABILITY AND PROTECTION* (2014) (Shue points out that climate change constitutes an unprecedented challenge for human civilization. He is especially concerned about ethics, human rights, and how to protect the most vulnerable in our societies.); see also DOMINIC ROSER & CHRISTIAN SEIDEL, *CLIMATE JUSTICE—AN INTRODUCTION* (2017) (Roser & Seidel guide readers through moral issues that surround climate change, especially how we should distribute the burden of climate action between industrialized and developing countries); see also DAVID NAGUIB PELLOW, *WHAT IS CRITICAL ENVIRONMENTAL JUSTICE?* (2018) (Pellow introduces a new framework for critically analyzing Environmental Justice scholarship and activism. For example,

modifying it to highlight the unequal burdens climate change imposes on low-income communities and communities of color.

Environmental justice advocates sometimes call neighborhoods contaminated with chemical pollutants sacrifice zones.⁴⁵ In Houston, some neighborhoods became sacrifice zones when they became hosts to toxic facilities.⁴⁶ It is possible that businesses found that low-income and minority communities are less likely than wealthier communities to resist new, polluting neighbors.⁴⁷ The end result is that some communities experience health hazards on normal days.⁴⁸ Superstorms and their aftermaths add and compound dangers.⁴⁹

Harvey dumped rain on everyone and everything in Houston and southeast Texas. Flooding started right away.⁵⁰ With Harvey,

he explains how the Black Lives Matter movement in the United States relates to the environmental justice movement.).

⁴⁵ STEVE LERNER, *SACRIFICE ZONES—THE FRONT LINES OF TOXIC CHEMICAL EXPOSURE IN THE UNITED STATES* (2010). Lerner repurposed a Cold War term coined by U.S. government officials to designate areas contaminated with radioactive pollutants generated by nuclear weapon manufacturing. For more information about environmental justice, see ROB NIXON, *SLOW VIOLENCE AND THE ENVIRONMENTALISM OF THE POOR* (2011) (Nixon, Rachel Carson Professor of English, examines writers who advocate for environmental justice for the poor in the global South. He highlights writers who environmental health and social justice through a humanities lens.).

⁴⁶ DORCETA E. TAYLOR, *TOXIC COMMUNITIES—ENVIRONMENTAL RACISM, INDUSTRIAL POLLUTION, AND RESIDENTIAL MOBILITY* (2014). Taylor, a professor in the School of Natural Resources and Environment at the University of Michigan, explores environmental racism. She explores “why certain communities host toxic facilities and why certain populations are more likely to live in close proximity to those facilities.” Taylor examines the link between entrenched segregation and zoning ordinances that privilege wealthier communities. She also considers the possibility that businesses have found the paths of least resistance in low-income and minority communities. *See also* NAACP, *supra* note 15. The NAACP points out the race (not class) is the number one indicator for the placement of toxic facilities in the United States.

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ Flavelle, *supra* note 14.

⁵⁰ WALKER, *supra* note 1, at 129-30. Walker explains that floods “are events that happen when water moves and accumulates unusually. He also points out that “[t]he determination of where floods become problematic—where they interact with and damage things that are valued—is down to human processes of establishing settlements, building infrastructure, growing crops and so on, and the ways that water flows are channeled, directed and resisted.”

human actions and inactions meant that flooding affected people and places differently.⁵¹ For example, people in some communities created sophisticated infrastructure layouts that lessened the impact of the flooding.⁵² In contrast, individuals in other communities offered flood planning that consisted of a series of ditches.⁵³ Floods interact with people in distinctive phases: “pre-flood preparedness, to warning, evacuation (in some cases), to the flood period, to recovery and living with the aftermath, through to rebuilding and restitution.”⁵⁴ Each phase tests individuals’ and groups’ resistance⁵⁵ and resilience.⁵⁶ Additionally, inequity and injustice are at issue in each phase, determining “who is prepared, who is warned, who evacuates, who is killed, who suffers the worst health effects and damages, who is best able to recover and who gets to rebuild.”⁵⁷

Harvey matters because it puts a spotlight on environmental and climate injustice. Harvey and its aftermath shows what happens when society subjects low-income and communities of color to greater environmental hazards and fewer societal benefits than more privileged segments of society experience.⁵⁸ Harvey also shows the cycle of fossil fuel damage.⁵⁹ Low-income and communities of color live in the shadow of petrochemical plants and experience pollution on a daily basis. Then, when climate-induced weather events strike, they experience an acute crisis.⁶⁰ In essence,⁶¹ environmental regulations

⁵¹ *Id.* Resilience is “the ability to cope with or adapt to hazard stress, encompassing preparedness and process of relief, rescue and recovery.”

⁵² *Id.*

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ *Id.* at 135. Resistance is “the capacity of an individual or a group to withstand the impact of a hazard.”

⁵⁶ *Id.*

⁵⁷ *Id.* at 129-30.

⁵⁸ Haragan, *supra* note 39.

⁵⁹ NAACP, *supra* note 15.

⁶⁰ Carmin Chappell, *Climate Change in the US Will Hurt Poor People the Most, According to a Bombshell Federal Report*, CNBC (Nov. 26, 2018), <https://www.cnbc.com/2018/11/26/climate-change-will-hurt-poor-people-the-most-federal-report.html>.

⁶¹ Laurel Blatchford, *Climate Change Disproportionately Affects Low-Income Communities*, ENTERPRISE COMMUNITY (Dec. 7, 2018), <https://www.enterprisecommunity.org/blog/climate-change-disproportionately-affects-low-income-communities>.

“do little to safeguard the well-being of those who live in the shadow of heavy industry and cannot afford to move to a safer location.”⁶²

II. HARVEY AND THE LAW

A. *Three Federal Laws*

There are three federal statutes especially relevant to the issue of mitigating and cleaning up after the effects of storms such as Harvey: the Clean Air Act (“CAA”);⁶³ the Clean Water Act (“CWA”);⁶⁴ and the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”).⁶⁵

1. THE CLEAN AIR ACT

The CAA was passed by Congress in 1963,⁶⁶ predating the establishment of the Environmental Protection Agency (“EPA”) by seven years.⁶⁷ The original purpose of the CAA was to establish a federal program within the U.S. Public Health Service to research techniques for monitoring and controlling air pollution.⁶⁸ The modern form of the CAA originated in 1970 when the statute was amended to authorize the creation of federal and state regulations limiting emissions from industrial and mobile (i.e., cars, planes, trains, etc.) sources, as well as expand enforcement authority.⁶⁹ While the CAA

⁶² LERNER, *supra* note 47 at 298, 314. Lerner points out that “we live in a nation divided by pollution exposure levels.”

⁶³ 42 U.S.C. § 7401 et seq (2015).

⁶⁴ 33 U.S.C. §1251 et seq (2015).

⁶⁵ 42 U.S.C. §9601 et seq (2015).

⁶⁶ *Evolution of the Clean Air Act*, U.S. ENVTL. PROTECTION AGENCY [EPA], <http://www.epa.gov/clean-air-act-overview/evolution-clean-air-act>.

⁶⁷ *Id.*

⁶⁸ Ming Yang and Xin Yu, *Energy Efficiency: Benefits for Environment and Society* (2015), http://behineh-sazan.ir/wp-content/uploads/2017/01/Green-Energy-and-Technology-Ming-Yang-Xin-Yu-auth-Energy-Efficiency_-Benefits-for-Environment-and-Society-Springer-Verlag-London-2015.pdf.

⁶⁹ EPA, *supra* note 65.

was not the first federal environmental statute, it is often considered innovative in its federal enforcement of environmental standards.⁷⁰

2. THE CLEAN WATER ACT

Following the passage of the CAA, the CWA was enacted in 1972.⁷¹ As its name suggests, the CWA focuses on maintaining the chemical, physical, and biological integrity of the waters of the United States.⁷² In a similar manner to the CAA, the CWA grants the EPA the authority to institute and enforce regulations that limit industrial pollution in protected waters.⁷³ The CWA has made highly positive contributions to the environment⁷⁴ and has moved us far away from the burning rivers of the 1960s.⁷⁵ However, a substantial portion of the nation's waters continue to violate the CWA's water quality standards.⁷⁶

3. THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

The third statute—and perhaps the most relevant to Harvey and its cleanup—is CERCLA, which lawyers often refer to as the Superfund Law.⁷⁷ CERCLA was passed in 1980 in response to

⁷⁰ David M. Driesen, Thomas M. Keck and Brandon T. Metroka, *Half a Century of Supreme Court Clean Air Act Interpretation: Purposivism, Textualism, Dynamism, and Activism*, 75 WASH. & LEE L. REV. 1781 (2018).

⁷¹ *History of the Clean Water Act*, EPA, <http://www.epa.gov/laws-regulations/history-clean-water-act>.

⁷² 33 U.S.C. §1251(a) (2015).

⁷³ *History of the Clean Water Act*, *supra* note 70.

⁷⁴ William L. Andreen and Shana Campbell Jones, *The Clean Water Act: A Blueprint for Reform*, CRP WHITE PAPER 802 (2008).

⁷⁵ Mark Urycki, *50 Years Later: Burning Cuyahoga River Called Poster Child for Clean Water Act*, NAT'L PUB. RADIO (2019), <http://www.npr.org/2019/06/18/733615959/50-years-later-burning-cuyahoga-river-called-poster-child-for-clean-water-act>. The Cuyahoga River caught fire in Cleveland when sparks from a passing train ignited oil-soaked debris that was floating on the water's surface. Journalists captured dramatic images that inspired environmental reform.

⁷⁶ *National Summary of State Information*, EPA, http://ofmpub.epa.gov/waters10/attains_nation_cy.control.

⁷⁷ *Superfund: CERCLA Overview*, EPA, <https://www.epa.gov/superfund/superfund-cercla-overview>.

concerns surrounding hazardous waste sites across the country and is intended to facilitate their cleanup.⁷⁸ CERCLA allows the EPA and state agencies to cast a wide net when searching for parties responsible (and therefore liable) for causing these sites to become hazardous.⁷⁹ These parties include past and present generators and transporters of hazardous materials to the site, as well as current and sometimes past owners of the site.⁸⁰ However, even with such a wide array of potentially responsible parties, tracking down polluters often proved difficult. Hence, the Superfund was established to pay for the cleanup of “orphan” sites by taxing the chemical and petroleum industries.⁸¹ This tax has since expired, but CERCLA continues to be funded by appropriations by Congress.⁸²

Under CERCLA, there are two responses to a hazardous substance release or the threat thereof: removal actions and remedial actions.⁸³ Removal actions are short-term, temporary efforts aimed at curtailing immediate harm.⁸⁴ Examples of removal actions include putting up security fencing or otherwise restricting access, temporary evacuation and relocation of threatened individuals, and provision of alternative water supplies in the case of contaminated waters.⁸⁵ Remedial actions seek to permanently resolve the danger and take place after the initial threat has been abated.⁸⁶ Remedial actions require careful study to determine how to solve the issue best, and they can take place years after the hazardous release occurred.⁸⁷ In the immediate aftermath of a hurricane such as Harvey, citizens and government actors need to place affected sites on the National

⁷⁸ Thomas C. Voltaggio and John Adams, *Superfund: A Half Century of Progress*, EPA ALUMNI ASSOC. (2016), <http://www.epaalumni.org/hcp/superfund.pdf>

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Superfund: CERCLA Overview*, EPA, <http://www.epa.gov/superfund/superfund-cercla-overview>.

⁸² Robin Kundis Craig, *Cleaning Up Our Toxic Coasts: A Precautionary and Human Health-Based Approach to Coastal Adaptation*, 36 *PACE ENVTL. L. REV.* 3, 39-69 (2018).

⁸³ Jerry L. Anderson and B. Kip Shelby, *Classification of CERCLA Response Actions as Removal or Remedial*, 23 *ENVTL. L. REP.* 10659-64 (1993).

⁸⁴ *Id.*

⁸⁵ 42 U.S.C. §9601(23) (2015).

⁸⁶ *Id.*

⁸⁷ *Id.*

Priorities List (“NPL”) to ensure that the EPA makes clean-up a priority.⁸⁸

4. CERCLA IN THE CONTEXT OF HARVEY

A. Federal Laws

There are sixteen Superfund sites in Harris County,⁸⁹ the county in which Houston lies. When Harvey hit Houston, thirteen of these sites were flooded, spreading toxic chemicals across parts of the city.⁹⁰ To this day, some of the homes contaminated by the noxious waters remain unsafe to live in.⁹¹ Certainly, the damage could have been worse. The EPA had taken precautions to protect Superfund sites from flooding.⁹² A 2012 risk assessment conducted by the EPA identified Superfund sites that could be put at risk due to climate change and rising sea levels⁹³—e.g., those within immediate proximity to the coastline. The EPA’s Climate Change Adaption Plan adopted in 2014 laid out a strategy to protect these sites from climate change-related flooding.⁹⁴ However, the assessment did not—and perhaps could not—predict the unprecedented amount of precipitation that deluged Houston during Harvey.⁹⁵ Several Superfund sites located just outside of the floodplains considered to be at risk were damaged and their toxic contents were spread by floodwaters.⁹⁶ In other words,

⁸⁸ For a discussion of the use of removal actions, see *Non-Critical Time Removal Actions*, EPA, <http://www.epa.gov/superfund/non-time-critical-removal-actions>.

⁸⁹ *Climate issues related to Hurricane Harvey*, SABIN CTR. FOR CLIMATE CHANGE LAW (Aug. 31 2017), <http://blogs.law.columbia.edu/climatechange/2017/08/31/climate-law-issues-related-to-hurricane-harvey/>.

⁹⁰ Brie Sherwin, *After the Storm: The Importance of Acknowledging Environmental Justice in Sustainable Development and Disaster Preparedness*, 29 DUKE ENVTL. LAW & POLICY FORUM 2, 273-300 (2019).

⁹¹ *Id.* at 275.

⁹² *Superfund climate resistance*, EPA, <http://www.epa.gov/superfund/superfund-climate-resilience#impacts>.

⁹³ SABIN CTR., *supra* note 87.

⁹⁴ *Superfund climate resistance*, *supra* note 90.

⁹⁵ SABIN CTR., *supra* note 87.

⁹⁶ Darryl Fears and Brady Dennis, *Houston’s Polluted Superfund Sites Threaten to Contaminate Floodwaters*, WASH. POST (2017), <http://www.washingtonpost.com/news/energy->

hazardous sites located within floodplains certainly need extra investment and protection, but these areas are not the only ones that pose a widespread health risk when storms like Harvey hit. Given the commonly accepted outlook regarding our climatic future,⁹⁷ sites further inland may need more attention than we think.

Harvey was a uniquely devastating storm. However, the realities of climate change may ensure that storms like Harvey are no longer such an anomaly. In the period from 1981 to 2000, a storm with Harvey's magnitude had an annual probability of about 1%.⁹⁸ By 2081 to 2100, this figure is expected to increase to about 18%.⁹⁹ Storms like Harvey are going to become less of an "if" and more of a "when,"¹⁰⁰ and steps need to be taken to prevent future environmental devastation. At the federal level, CERCLA, the CAA, and the CWA all provide methods of mitigating the effects of Harvey-like storms. Although the newest of these laws was passed almost 40 years ago, they can still prove useful in combating modern problems.

The statute that most directly addresses this issue is CERCLA, as it focuses on cleaning up hazardous sites before they pose a widespread health threat.¹⁰¹ Despite the Trump administration's proposals to drastically cut the EPA's budget,¹⁰² Congress appropriated nearly \$1.1 billion to the Superfund in 2019, with included funds to be granted to state and tribal governments to aid in their own cleanup efforts.¹⁰³ Indeed, state and local actors can often

environment/wp/2017/08/29/houstons-flood-threatens-to-turn-polluted-superfund-sites-into-a-toxic-gumbo/?noredirect=on&utm_term=.a5ed02938107. The average distance between Superfund sites and similar hazardous areas to the floodplains was 44 feet. *Id.*

⁹⁷ John Cook, *Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature*, ENVTL. RESEARCH LETTERS (June 2013) (finding that 97 percent of scientific articles that addressed anthropogenic global warming agreed that the warming is real and is caused by human activity and that 96 percent of scientists "who authored papers expressing a view on [anthropogenic global warming] . . . endorsed the consensus.").

⁹⁸ Kerry Emanuel, *Assessing the Present and Future Probability of Hurricane Harvey's Rainfall*, PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, 114(48), 12681-84 (2017).

⁹⁹ *Id.* at 12681.

¹⁰⁰ *Id.* at 12681-84.

¹⁰¹ Anderson & Shelby, *supra* note 81.

¹⁰² Craig, *supra* note 80, at 42.

¹⁰³ *FY 2019 EPA budget in brief*, EPA (2019),

<http://www.epa.gov/sites/production/files/2018-02/documents/fy-2019-epa-bib.pdf>.

prove invaluable in the cleanup of Superfund sites because of their unique understanding and attachment to the sites within their respective purviews.¹⁰⁴

CERCLA contains one provision in particular that is especially relevant to the discussion of Harvey: the Emergency Planning & Community Right-to-Know Act (“EPCRA”). EPCRA came about when CERCLA was amended in 1986 with the Superfund Amendments and Reauthorization Act (“SARA”).¹⁰⁵ EPCRA requires state governors to create an emergency response commission for their states.¹⁰⁶ These state commissions then split their respective states into emergency planning districts and designate local committees for each district.¹⁰⁷ Each committee develops and maintains an emergency response plan for any facility in the district that handles a certain amount of “extremely hazardous substances.”¹⁰⁸ These plans identify these facilities and the routes they use to transport hazardous substances, describe on-site and off-site emergency response procedures, and designate a facility coordinator and a community coordinator to execute the plan.¹⁰⁹ Each chemical facility within a district must provide the committee with information necessary to create their plan, and they must immediately notify the committee when a hazardous substance is released into the environment.¹¹⁰

Although this seems like a substantial sum of money, it represents a downward trend from the \$2 billion appropriated in 1999 and is far from enough to properly address the issue of cleaning Superfund sites. *See Superfund: trends in federal funding and cleanup of EPA’s nonfederal national priorities list sites* (2015), U.S. GOVERNMENT ACCOUNTABILITY OFFICE, <http://www.gao.gov/assets/680/672734.pdf>

¹⁰⁴ Craig, *supra* note 81, at 44-45, 48.

¹⁰⁵ *Summary of the Emergency Planning & Community Right-to-Know Act*, EPA, <http://www.epa.gov/laws-regulations/summary-emergency-planning-community-right-know-act>.

¹⁰⁶ Lauren Mulhern, *The Arkema Chemical Facility Incident: How the Regulation of Reactive Chemicals and the Incorporation of Climate Change Risks in Emergency Response Planning Could Mitigate and Prevent Future Accidental Chemical Releases*, COLO. NAT. RESOURCES ENERGY & ENVTL. L. REV. 30, 143 (2019).

¹⁰⁷ *Id.* at 162.

¹⁰⁸ *Id.*

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

However, not all facilities fully comply with these requirements, which can lead to public health disasters such as the Arkema plant incident.¹¹¹

The Arkema chemical plant, located about twenty miles northeast of Houston, manufactures organic peroxides, a type of chemical used in the manufacture of plastics.¹¹² These organic peroxides must be kept cool or else they can react violently, resulting in a fire or explosion.¹¹³ When Harvey was approaching Houston, all 205 individuals within a 1.5-mile radius of the facility were evacuated out of fear that the refrigeration trailers housing the chemicals would lose power and explode.¹¹⁴ A small crew of twelve Arkema employees remained at the plant to maintain the trailers as long as possible.¹¹⁵ On August 29, the power at the plant went out, the refrigeration failed, and the trailers began to ignite, spreading toxic fumes within and outside the evacuation perimeter.¹¹⁶

Although Arkema was obligated under ECPRA to announce these releases to emergency responders, they neglected to do so.¹¹⁷ As a result, multiple individuals, including twenty-one emergency responders, were caught off-guard and exposed to the gas cloud; these individuals later exhibited signs of chemical exposure.¹¹⁸ In addition to the gas cloud, floodwaters carried wastewater from the facility throughout the area.¹¹⁹ Those injured by exposure to the gas cloud and toxic waters filed a class action suit against Arkema in October 2017.¹²⁰ The Arkema incident illustrates that when firms eschew their obligations under environmental statutes and/or do not plan for the storms of the future, the lives of innocent and unknowing people can be severely impacted.

¹¹¹ *Id.*

¹¹² *Investigation report: organic peroxide decomposition, release, and fire at Arkema Crosby following Hurricane Harvey flooding*, U.S. CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD [CSB] (2018), <http://www.csb.gov/file.aspx?DocumentId=6063>.

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ Mulhern, *supra* note 104.

¹¹⁸ CSB, *supra* note 110.

¹¹⁹ *Id.*

¹²⁰ Class Action Complaint, *Shannan Wheeler v. Arkema France*, No. 4:17-cv-02960, (D. Tex. Oct. 3, 2017).

Along with CERCLA, the CAA and CWA can be used to prevent environmental hazards in both direct and indirect ways. Directly, the acts impose regulations and limits on industrial pollution, as previously discussed. These regulations hold firms and other private actors accountable for polluting the air and waters. All states have their own agencies governing their environments;¹²¹ the one most relevant to Harvey and Houston is the Texas Commission on Environmental Quality (“TCEQ”). While these state regulators can be effective at enforcing rules during times of calm, they sometimes fail at holding polluters accountable during and after a disaster.¹²² Addressing this deficiency is where the indirect impact of the CAA and CWA show themselves in the form of citizen lawsuits. The CAA¹²³ and CWA¹²⁴ both contain provisions that allow citizens to sue private and public violators of the acts.

Citizen lawsuits allow individuals harmed by pollution to make themselves whole through federal statutes when their state or locality offers them no such protection. But perhaps the most important aspect of citizen lawsuits is their ability to act as a deterrent to environmentally irresponsible behavior.¹²⁵ The looming threat of being sued post-disaster for pollution spilled during a storm may be enough to spur some firms into taking extra pre-disaster precautions.¹²⁶ Additionally, preemptive lawsuits—i.e., filing suit long before a disaster occurs—by concerned citizens could also be a useful tool for compelling firms to clean up now before it is too late.¹²⁷ One example

¹²¹ *Health and Environmental Agencies of U.S. States and Territories*, EPA, <http://www.epa.gov/home/health-and-environmental-agencies-us-states-and-territories>.

¹²² Immediately following the Harvey disaster, Governor Abbott of Texas suspended many of the TCEQ’s rules regarding air and water pollution, allowing firms to get away with pollution that they would otherwise be penalized for. The suspension was lifted in April 2018. See Texas Commission on Environmental Quality, *Request for Suspension of TCEQ Rules* (Aug. 28, 2017), <http://www.tceq.texas.gov/assets/public/response/hurricanes/suspension-of-tceq-rules-8.28.17.pdf>.

¹²³ 42 U.S.C. § 7604 (2012).

¹²⁴ 33 U.S.C. § 1365 (2012).

¹²⁵ *RCRA as a Tool for Environmental Justice Communities and Others to Compel Climate Change Adaptation*, 131 HARV. L. REV. 2409 (2018). While this article focuses on suing under RCRA, a different environmental statute, the same motivations and principles apply when suing under the CAA or CWA.

¹²⁶ *Id.*

¹²⁷ *Id.*

of this kind of lawsuit is *Conservation Law Foundation, Inc. v. ExxonMobil Corp.*, currently being heard in the U.S. District Court for the District of Massachusetts.¹²⁸ The suit concerns an ExxonMobil terminal located north of Boston that has leaked carcinogenic chemicals into nearby waterways in the past.¹²⁹ The Conservation Law Foundation (“CLF”) is arguing that, as things currently stand, climate change will bring about storms that will inevitably cause the ExxonMobil terminal to spill chemicals and violate the CWA.¹³⁰ Thus, ExxonMobil must make adaptive changes to prevent these future spills.¹³¹ This suit represents a new way to utilize the CWA and could serve as the framework for suits to be filed by Harvey victims.¹³²

B. State Laws

The citizen suit provisions of the CAA and CWA can be powerful tools for victims of pollution following a natural disaster. Unfortunately, in some states, they may be the only practical tools available to victims, despite the existence of state laws that at first glance, might give the appearance that they would be helpful in natural disasters. The five states most affected by hurricanes, in descending order, are Florida, Texas, North Carolina, Louisiana, and South Carolina.¹³³ Louisiana¹³⁴ and Florida¹³⁵ each have environmental statutes similar to the CAA and CWA and that contain citizen suit provisions. The primary limits to the Louisiana statute are that a citizen cannot sue prior to thirty days after notifying the secretary of

¹²⁸ Thomas Landers, *A New Path to Climate Justice, Adaptation Suits Against Private Entities*, 30 GEO. ENVTL. L. REV. 321 (2018).

¹²⁹ *Id.*

¹³⁰ Complaint at 21, *Conservation Law Foundation, Inc. v. ExxonMobil Corporation*, No. 1:16-CV-11950 (D. Mass. Sept. 29, 2016).

¹³¹ *Id.* For a thorough review of the ExxonMobil case, see Landers, *supra* note 126.

¹³² Sebastien Malo, *Hurricane Harvey’s Aftermath Could See Pioneering Climate Change Lawsuits*, REUTERS (Sept. 5, 2017), <http://www.reuters.com/article/us-storm-harvey-climatechange/hurricane-harveys-aftermath-could-see-pioneering-climate-lawsuits-idUSKCN1BG2NI>.

¹³³ Chris Landsea, *How many direct hits by hurricanes of various categories have affected each state?* NAT’L OCEANIC & ATMOSPHERIC ADMIN., June 19, 2019, <http://www.aoml.noaa.gov/hrd/tcfaq/E19.html>.

¹³⁴ 30 LA. STAT. § 2026.

¹³⁵ 10 FLA. STAT. § 120.69(1)(b).

Louisiana's environmental agency and alleged violator,¹³⁶ and a citizen cannot sue if said environmental agency is already prosecuting the alleged violator.¹³⁷

Florida shares these requirements (with the notification period set to sixty days)¹³⁸, as well as the conditions that any citizen suits file in the name of the state¹³⁹ and the state has the right to intervene and take over the case.¹⁴⁰ South Carolina's Pollution Control Act ("PCA") had a citizen suit provision until a bill was passed that eliminated the provision from the Act.¹⁴¹ The bill, however, contained a clause that allowed citizens to sue for pollution that occurred prior to the bill's passage.¹⁴² Two bills that have each been passed by one of South Carolina's legislative bodies threaten to prevent *all* PCA citizen suits, including those for pre-2012 pollution.¹⁴³ The environmental statutes of North Carolina¹⁴⁴ and Texas¹⁴⁵ lack citizen suit provisions as well. However, Texas does have a system in place for state prosecution of polluters based on information provided by private citizens.¹⁴⁶

The lack of citizen suit provisions in three of the five states most likely to be affected by hurricanes, further underscores the importance of federal rules such as the CAA and CWA. While each of these states has an agency with the authority to sue polluters, it is unrealistic to assume that a state could address each case in a timely manner, especially when considering budget cuts¹⁴⁷ and a reduction in federal EPA actions against polluters.¹⁴⁸ It may also be the case that

¹³⁶ 30 LA. STAT. § 2026(b)(1).

¹³⁷ *Id.* at § 2026(b)(2).

¹³⁸ 10 FLA. STAT. § 120.69(1)(b)(i).

¹³⁹ *Id.* at § 120.69(1)(b)(ii)(c).

¹⁴⁰ *Id.* at § 120.69(1)(b)(ii)(d).

¹⁴¹ S.C. Gen. Assemb. H4654, 119th Sess. (2012).

¹⁴² *Id.*

¹⁴³ S.C. Gen. Assemb. H3925, 120th Sess., 2013-2014 (2013) (a House bill) and S.C. Gen. Assemb. S229, 121st Sess., 2015-2016 (2016) (a Senate bill).

¹⁴⁴ *See generally* N.C. GEN. STAT. § 113A.

¹⁴⁵ *See generally* 30 TEX. ADMIN. CODE.

¹⁴⁶ 30 TEX. ADMIN. CODE § 70.4.

¹⁴⁷ Marie Cusick, *Cash-strapped State Environmental Agencies Brace for Budget Cuts*, NAT'L PUB. RADIO (2017), <http://www.npr.org/2017/04/11/523450904/cash-strapped-state-environmental-agencies-brace-for-budget-cuts>

¹⁴⁸ Eric Lipton and Danielle Ivory, *Under Trump, E.P.A. has Slowed Actions against Polluters, and put Limits on Enforcement Officers*, N.Y. TIMES (Dec. 10,

state governments simply have little interest in holding polluters accountable at all following a disaster.

III. HOW TO CREATE A MORE JUST, LEGALLY SOUND FUTURE

A. *Recommendation One: Promote resilience in vulnerable communities*

Responding to climate change disasters using justice and legal principles is a dynamic process.¹⁴⁹ Resilience is “the ability to cope with or adapt to hazard stress.”¹⁵⁰ With regard to resilience, promoting everyone’s resilience is a good idea, and is vital for vulnerable communities. Gordon Walker’s 2012 work, *Environmental Justice—Concepts, Evidence and Politics*, provides an excellent framework for thinking about how to define resilience because he studied Katrina a justice context.¹⁵¹

First, Walker begins his resilience analysis by highlighting pre-flooding preparedness. In particular, he suggests that communities must make preparedness effective for everyone. When communities enact awareness programs and create emergency plans, they must factor in differences such as language and capability to act.¹⁵² In the Harvey context, communities must consider the needs of Spanish-speaking residents.

Second, Walker highlights warning and evacuation processes. Communities must design warnings and evacuation processes in ways that consider everyone, including residents who lack access to communication technologies. He reminds us that some people will need more assistance than others, especially elderly and/or disabled community members.¹⁵³

Third, Walker points out that emergency services and other agencies must be committed to equality. They cannot discriminate. They must work to assure that all residents have their basic needs met,

2017) <http://www.nytimes.com/2017/12/10/us/politics/pollution-epa-regulations.html>.

¹⁴⁹ WALKER, *supra* note 1, at 220.

¹⁵⁰ *Id.* at 135.

¹⁵¹ See generally *id.*

¹⁵² *Id.*

¹⁵³ *Id.*

including affordable, safe housing and access to health care.¹⁵⁴ Finally, Walker makes it clear that recovery cannot happen unless people can remain employed, with a stable income.¹⁵⁵ He also urges communities to provide universal access to flood insurance.¹⁵⁶ With incomes and insurance, residents will be able to “re-establish their homes in a more flood-proof condition, or to move elsewhere if they wish.”¹⁵⁷ All of these suggestions will help Houston-area communities and are worth pursuing before the next storm hits.

B. Recommendation Two: Advocate for climate change updates to CERCLA

Government agencies need to hold companies accountable for the damage they cause. Firms respond best when the cost of failing to respond is high. Right now, firms experience no real consequences when they hide information about what chemicals they have released during and after a disaster. Therefore, the most effective way to ensure transparency is to amend the EPCRA to add a new, significant criminal penalty for first that fail to report toxic releases to emergency responders as the act mandates. A further amendment to the EPCRA could provide that anyone injured as a result of a company’s failure to report a toxic release from a natural disaster to emergency responders are entitled to bring a civil action for their injuries. This amendment should allow for treble damages. The amendments this article suggests give teeth to the EPCRA’s emergency reporting requirements, thereby increasing transparency.

C. Recommendation Three: Use data to establish links between exposure to specific toxins and health consequences

Individuals and communities should be able to look at a website to see which chemicals, in what quantities, a specific storm knocked loose.¹⁵⁸ This same site would allow researchers to add data

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ *See* Flavelle, *supra* note 14.

about which toxins are in people's bodies at defined points after a storm, and outline the health effects of specific contaminants.¹⁵⁹ Additionally, the website would share information about whether specific contaminants can accumulate with each storm.¹⁶⁰ Finally, the website would include information about which facilities emit which chemicals and contaminants.¹⁶¹ Researchers have already started on a path to make data-driven transparency a reality.¹⁶² Medical researchers are gathering and analyzing data.¹⁶³ Data scientists are making clear that data collection has the potential to become a powerful tool.¹⁶⁴ Data scientists can use data to ask powerful questions, and additionally, data can be used to predict and plan for the real effects of storms.¹⁶⁵ Communities groups, governmental bodies and officials, and journalists can also all use data to encourage polluting industries to engage in clean-up to prevent future harm and litigation.

CONCLUSION

As environmental injustice evolves with climate change, environmental advocates must work with vulnerable communities to establish empowering strategies and priorities. We do not yet know the full reality of climate change. One scientist has stated that climate change is “nothing less than concentrated human suffering.”¹⁶⁶

¹⁵⁹ *Id.*

¹⁶⁰ *Id.*

¹⁶¹ *Id.*

¹⁶² *Id.*

¹⁶³ *Id.*

¹⁶⁴ Gwen Rino, *Why Social Justice Warriors Should Use Data Science*, SPRINGBOARD (Mar. 1, 2018), <https://www.springboard.com/blog/3-reasons-social-justice-warriors-should-learn-data-science/>; *see also* DATA-POP ALLIANCE, at <https://datapopalliance.org/>. Data-Pop is a global coalition on Big Data and development created by the Harvard Humanitarian Initiative, MIT Media Lab, and Overseas Development Institute. It “brings together researchers, experts, practitioners, and activists to promote a people-centered Big Data revolution through collaborative research, capacity building, and community engagement.” The organization strives to “serve the interests of people across the globe, especially those of poor and vulnerable populations.”

¹⁶⁵ *Id.*

¹⁶⁶ Adam Frank, *Climate, Power, Money and Sorrow: Lessons of Hurricane Harvey*, NAT'L PUB. RADIO (Sept. 6, 2017), <http://www.npr.org/sections/13.7/2017/09/06/548658019/climate-power-money-and-sorrow-lessons-of-hurricane-harvey>.

Policymakers, lawmakers, citizens, and companies can take action to counter this dire prediction. They can lessen the likelihood of creating even more concentrated human suffering than what already exists. This Article has suggested action items for a range of stakeholders to work on now. Each recommendation assumes that policymakers, lawmakers, and citizens have everything to gain by working to (1) increase resilience for all (and especially for vulnerable communities), (2) amend federal law to promote prevention, clean-up and accountability, and (3) use data to support environmental justice goals. Let's leave something positive in Harvey's wake—increased justice and improved laws.
