

An Environmental Lawyer's Fraught Quest for Legal Tools to Hold Back the Seas

Michael B. Gerrard

The law is the principal mechanism by which society resolves disputes and implements policies. For more than forty years, I have worked to use the law to address environmental problems, initially by trying to stop projects that would increase pollution and harm communities. But there are limits to what the courts can do without explicit direction from legislatures. Climate change is a prime example. Some have seen litigation as a silver bullet, but at least so far that has not been the case. Elections matter more than lawsuits. Until and unless elections bring to power a president, a Congress, and local officials who will take the necessary measures, litigation is needed to inhibit those who will try to move backwards, spur on those with good intentions, help implement the policies set by wise Congresses past, and continue the quest for redress for victims. Well-crafted laws can also lead the way to solutions.

I was born in 1951 in a since-razed hospital on West 110th Street in Manhattan, six blocks from where I now teach at Columbia Law School. My parents were graduate students at Columbia, and after my father received his Ph.D. in sociology, we moved from town to town in search of a tenured position. In 1959, he landed one at a small college in Charleston, West Virginia. We moved there when I was entering third grade and I attended the Charleston public schools through high school.

We lived in a college-owned house on the banks of the Kanawha River. The Charleston area was and is a hub of the petrochemical industry. Union Carbide, Dow Chemical, Monsanto, FMC, and other companies built factories there, attracted by the cheap coal-generated electricity and the ability to dump waste into the Kanawha. Coal barges chugged back and forth all day and night, but there was little recreational boating – the river was so polluted that no one wanted to dip a toe in, and fishing was pointless. The air wasn't much better.

In 1968, a family friend, Paul Kaufman, a public interest lawyer and state senator, ran for governor of West Virginia on an environmental protection platform. I campaigned for him that summer when I was between high school and

college. Kaufman lost badly, but the campaign sparked my first interest in the environment.

I entered Columbia as a freshman in September 1968. The previous spring, the university had been closed when students protesting the Vietnam War (among other things) took over several campus buildings. Throughout my four undergraduate years, the school was still roiled by protests over the war and civil rights. But the environmental movement was also building. The first Earth Day was April 22, 1970. I covered the events on campus for the *Columbia Daily Spectator*; those were probably my first writings on the environment. I majored in political science and wrote my senior thesis on the politics of air pollution in West Virginia.

After graduation in 1972, I worked for the Charleston bureau of the Associated Press, and then for another failed campaign (McGovern for President). A few months after Nixon was reelected, I returned to New York. I briefly worked as a paralegal at a Wall Street law firm, where I met a wonderful young woman, Barbara Seuling, who also worked there as a paralegal while she put herself through law school. Barbara and I started dating (and married in 1976). I then got a job with the Council on the Environment of New York City, which was affiliated with the mayor's office. This was the era when most of the major U.S. environmental laws were being passed, and it looked to me that the most effective environmental work was being done by the lawyers. I decided to go to law school to become an environmental lawyer. NYU Law School offered me a full scholarship, and I enrolled there in 1975.

While I was at the Council on the Environment, a portion of the elevated West Side Highway, along the Hudson River, collapsed, and a proposal emerged to fill in one-tenth of the cross-section of the river and build an interstate highway in a tunnel through that landfill. The cost, about \$2 billion, would be paid 90 percent by the federal government and 10 percent by New York State. Congress passed a law, pushed by Representative Bella Abzug, to allow states to "trade in" interstate highway money for smaller replacement roadways and mass transit. Since the New York subways were falling apart, many of us advocated using this provision; the highway project, called Westway, seemed to be a gross misallocation of resources. I wrote a paper for the Council about how much more energy it would take to build and operate Westway than to rehabilitate mass transit. While at NYU, I became an intern at the Natural Resources Defense Council (NRDC) and continued fighting Westway.

My ambition during law school had been to join the NRDC or the Environmental Defense Fund after graduation, but they were still small organizations and had no entry-level jobs. I had gotten to know the lawyers who were representing the Sierra Club and the other opponents of Westway, and they hired me. The firm, Berle, Butzel & Kass, was a small environmental boutique representing citizen groups, municipalities, and government agencies. We continued the litigation against

Westway and ultimately won, largely because the Army Corps of Engineers had lied about how the landfill would harm the striped bass of the Hudson River.

I practiced environmental law at the Berle firm from 1978 until it broke up in 1994. I then moved laterally to the New York office of Arnold & Porter, a major law firm based in Washington, D.C., taking all my clients and several associates with me. While practicing law, I also wrote books about environmental law. In 1992, I started teaching a seminar on hazardous waste law at Columbia Law School as an adjunct. A series of court decisions had made hazardous waste, and the potential liability for cleaning it up, the hottest issue in environmental law.

The United Nations Framework Convention on Climate Change was negotiated in 1992, and the Kyoto Protocol, which was designed to implement it, in 1997. But the United States Senate refused to ratify Kyoto, largely because it did not require China and India to reduce their greenhouse gas (GHG) emissions. Congress also didn't pass any climate change laws, so climate change was not a major topic of U.S. environmental law practice; there was little law to practice. The books I was writing were focused on hazardous waste and other environmental topics.

Much of my practice was very rewarding. I represented several communities in preventing the construction or enlargement of landfills, incinerators, highways, and other environmentally destructive projects. I represented the Village of Mount Kisco in Westchester County, New York, in a successful fight against a golf course that Donald Trump wanted to build nearby that would have released pesticides into the Village's drinking water supply. I did much of the environmental review work in the reconstruction of the World Trade Center site after 9/11. I helped the City of Niagara Falls secure funds to build a new drinking water plant from the chemical company that had contaminated the old one. I defended the Metropolitan Museum of Art against neighbors across the street who were suing because they didn't like the construction disruption from the rebuilding of the Greek and Roman galleries. I tried many cases and argued many appeals, and I was able to turn down work I didn't like, such as fighting wind farms, homeless shelters, or affordable housing.

In the early 2000s, as I began to hear more and more about climate change, I thought about writing a book on that subject. I was very busy as chair of the Section of Environment, Energy, and Resources of the American Bar Association, but when my term ended in June 2005, I started work on a book that would be called *Global Climate Change and U.S. Law*. I educated myself on the subject and became extremely concerned. The book was published in 2007; I was invited to speak at numerous conferences, and the more I learned, the more worried I became. As I read yet more scientific studies about the perils of climate change, I began to feel guilty about not devoting myself more fully to this topic on which I had developed some expertise. I had become partner-in-charge of the 120-lawyer New York

office of my law firm, and a poll had twice rated me as the most prominent environmental lawyer in the world, but I was yearning to plunge into the fight against climate change.

In 2008, to my surprise, David Schizer, then the dean of Columbia Law School, contacted me to say they needed someone to join the faculty to teach environmental law, and perhaps I would be interested. After talking it over with Barbara, I called him back and suggested that I join the faculty to teach environmental law and start a center on climate change law. The center's purposes would be to develop legal techniques to fight climate change; to train the next generation of lawyers how to use them; and to develop legal resources for judges, lawyers, scholars, and students around the world. Dean Schizer quickly agreed.

So I resigned my partnership in Arnold & Porter (where I remain as senior counsel), was happy to give up my thirty-year habit of filling out a time sheet every day, and, in January 2009, became a full-time professor. I started that semester by teaching a course on climate change law; the registrar assigned me to a room that would hold twenty students, but it quickly became apparent that a larger room was needed. This was a time of great optimism for climate regulation. During the 2008 election campaign, both parties' presidential candidates (Barack Obama and John McCain) supported climate legislation; the issue didn't seem controversial. I joined Columbia the same month that Obama was inaugurated. In June 2009, the House of Representatives passed the Waxman-Markey Bill, which would have established an economy-wide cap-and-trade system and launched several other programs on climate change. The center I founded, later renamed the Sabin Center for Climate Change Law after receiving a large donation from a generous Long Island businessman named Andrew Sabin, prepared a database of the more than 150 rules that Waxman-Markey would have required so that we could track them and enlist Columbia scientists in the debates on how to shape them. We held a conference on Capitol Hill on preparing to implement the new law. We looked forward to the annual UN climate conference in Copenhagen in December 2009, where we hoped a new global agreement would be reached, much broader and stronger than the Kyoto Protocol.

But the industries that would be hurt by climate change mobilized very effectively. In late 2009, someone (the Russians are suspected but it was never proven) broke into a computer server in a UK university and stole and published more than one thousand e-mails among scientists. Right-wing media then took a few phrases from some of these e-mails out of context to make it appear that climate change science was a fraud. They accused a prominent climate scientist, Michael Mann, of falsifying studies. Several independent investigations established that all these accusations were nonsense. However, skepticism about climate science soared and (fueled by large campaign contributions from various fossil fuel companies and their owners) essentially captured the Republican Party. The Copenhagen confer-

ence was a bust, largely because President Obama could not promise much U.S. climate action; the Waxman-Markey Bill died in the Senate; and several Republican governors scaled back or eliminated their states' climate policies. Donald Trump, who in 2009 as a private citizen (together with Donald Jr., Eric, and Ivanka) had signed a full-page ad in *The New York Times* calling for international climate action, began tweeting in 2012 that climate change was "a Chinese hoax." The tremendous optimism of 2009 had soured, but the scientific case for urgent action was becoming even more compelling. To undermine this sense of urgency, opponents of climate action began attacking climate scientists legally and politically, and I participated in the formation of a group to help them, the Climate Science Legal Defense Fund.

In 2010 came another surprise. Phillip Muller, the permanent representative of the Republic of the Marshall Islands to the United Nations, approached me. He said his island nation, half-way between Hawaii and Australia, would in time be under water. That raised several novel legal questions: Is a country that is under water still a state? Does it still have a seat on the United Nations? What will be the legal status of its displaced people? Is there any recourse against those who did this?

Those were intriguing questions and I had none of the answers. So we convened an international conference on legal issues for threatened island nations, and with funds from the World Bank, flew in people from the Pacific island nations and elsewhere for three days of intense discussions at Columbia. During our formal dinner in the rotunda of Columbia's Low Library, the Marshallese delegation took the stage and sang Marshallese songs, led by the country's president on the ukulele. They were showing us that they have a culture worth preserving. Based on the talks at the conference, we produced a book that answered many of Muller's questions. The conference also helped lead to an effort by the Marshall Islands and another Pacific country facing similar perils, Palau, to ask the International Court of Justice in The Hague what are the obligations of the developed economies to slash their greenhouse gas emissions so that the small island nations do not drown. This effort was opposed by the Obama administration (which didn't want non-Americans telling the United States what to do), and did not garner the requisite majority vote of the United Nations General Assembly to get to the world court. But some of us are still trying.

I have traveled to the Marshall Islands twice. It requires getting to Honolulu, and from there taking one of the three weekly flights to the capital atoll of Majuro. (This assumes the Majuro airport is not flooded by the Pacific Ocean, which often happens. When it's not flooded but merely raining, the Marshallese capture the rainwater runoff from the runway as their principal source of drinking water; the underground water supplies on which the Marshallese relied for millennia have

become too salty as a result of sea level rise, or depleted by a growing population of people moving there from the “outer islands.”)

Preparing for my first trip to the Marshalls, I read up on their history. Archaeologists think they were first inhabited by Micronesian canoers about two thousand years ago. The country, with about 1,200 islands mostly grouped into twenty-nine atolls, took its name from a British sea captain who explored it in 1788. Germany established a protectorate over the Marshalls in 1886; missionaries converted most of the population to Christianity. The Japanese took over during World War I, and after heavy fighting, the United States seized the islands during World War II.

The United States found these islands – remote from everyone except the Marshallese, for whom it was their ancestral home – an irresistible place to test nuclear weapons after World War II. Between 1946 and 1958, the United States detonated sixty-seven nuclear bombs, mostly on Bikini and Enewetak Atolls. (The woman's swimwear item was named after this atoll, reportedly as something small and dangerous.) The people who lived there were relocated to other atolls, and then moved around as their new dwelling places were found to be too radioactive or unable to grow food.

Bikini Atoll has been deemed so contaminated that it will not be habitable for tens of thousands of years; only the cartoon character SpongeBob lives there. In an effort to make parts of Enewetak habitable again, the U.S. government began a cleanup program in 1958. Soldiers bulldozed much of the radioactive material left behind by the nuclear tests into the lagoon at the center of the atoll. The United States took the crater that had been left behind by one of the atomic weapons tests, threw in the worst material, including chunks of plutonium scattered around in a failed weapons test (collected into 437 plastic bags), and covered it with an eighteen-inch-thick cement shell.

There is no regular air service to Enewetak, but during my 2010 visit, there was a special flight from Majuro to dedicate a school that had been built with U.S. funds. The airplane carried the first lady of the Marshall Islands, the U.S. ambassador, and other dignitaries. The Marshall Islands government arranged for me to have a seat on the small plane, which couldn't make the seven-hundred-mile trip without stopping for fuel. So it landed in Kwajalein, home of the Ronald Reagan Ballistic Missile Defense Test Site, where the United States launches rockets and monitors any that might be launched by others (such as North Korea). The plane's operator, Air Marshall Islands, known locally as Air Maybe, had such poor credit that the pilot needed to carry a briefcase of cash to pay for the fuel. When we finally arrived at the Enewetak landing strip, we were greeted by women dancing to Marshallese music (wearing the customary mumus, definitely not bikinis) and given coconuts with straws to drink the juice. The dignitaries were put into a motorcade for the school dedication ceremony. I was directed to a small motorboat; three Marshallese men sped me across the lagoon to Runit Island. We passed

many small islands; there used to be more, but some were destroyed by hydrogen bombs. After about forty-five minutes, the boat ran up to a narrow beach. I was motioned to jump off. I followed one of the men through some scrub brush, and then saw the dome looming ahead. There were no signs, fences, or guards. My guide walked up the shallow incline of the dome and stood on its top; impulsively, I followed him. I wished I had brought a Geiger counter. I stood on top for perhaps a minute, looking at the vegetation that was growing between the cracks in the thin dome that separated me from the plutonium, which has a half-life of twenty-four thousand years. I then scampered off to catch the boat back to the plane for my return flight to Majuro.

I later learned that studies have shown that water under the dome rises and falls with the tides, so the inside of the unlined crater is in communication with the lagoon. The U.S. government acknowledges that the shell is cracked and could be blown off in a severe typhoon, dispersing its contents, but they say that would be harmless because, due to the residue from the nuclear tests, the radiation outside the dome is just as bad as that inside. Plutonium isotopes discovered in the South China Sea have been traced to the Marshall Islands, some 2,800 miles away.

Runit Dome, as it is known, is far from the greatest problem faced by the Marshall Islands. The highest point in the country is about two meters. When I asked one resident what they would do in case of a tsunami warning, the answer was, “climb up a tree.” Depending on what projections to believe – which depends, in turn, on future levels of GHG emissions, and on the pace of melting of the Greenland and Antarctic ice sheets – much of the Marshall Islands will be often under water by 2100. When (not if) the Marshall Islands are completely submerged, so will Runit Dome; but the islands will be uninhabitable well before that, because the roads will be cut off, there will be no local supply of food or fresh water, and flooding will be so frequent and dangerous that it will no longer be safe to live there.

In 1986, the United States negotiated a “Compact of Free Association” giving the Marshall Islands independence. They are now the Republic of the Marshall Islands, with a democratically elected government and a seat at the United Nations. The uninhabitable island of Bikini has a town hall on Majuro. The displaced people of Bikini still send a senator to parliament and go to the town hall to collect compensation checks. Many people in the country suffer from a variety of illnesses that they attribute to the persistent radiation.

The U.S. Congress established a Nuclear Claims Tribunal to adjudicate the claims of the Marshallese for damages from the nuclear testing. The Tribunal held years of hearings and awarded more than \$2 billion in damages, but Congress only appropriated \$150 million, and the U.S. federal courts ruled that they have no jurisdiction over the dispute. Thus, the United States has shafted the Marshall Islands in three ways: we dropped sixty-seven nuclear weapons on them; we estab-

lished a tribunal to judge their claims, but then never paid them; and now they are drowning from sea level rise that is caused in part by the United States. More than any other country, the Marshall Islands are the victims of the two greatest threats facing humanity: nuclear weapons and climate change.

The 1986 compact had another provision, in very partial recompense for the nuclear assault. Marshallese were given the ability to come to the United States without visas and work here permanently. About one-third of the country's roughly sixty thousand people have done so. In the mid-1980s, one Marshallese man, John Moody, happened to get a job at the Tyson poultry plant in Springdale, Arkansas. It went well, friends and relatives moved there and got jobs at Tyson, and today at least ten thousand Marshallese live in and around Springdale. The Republic has established a consulate in Springdale next to a barber shop. Candidates for president of the Republic campaign in Springdale. The children attend Arkansas schools; those who are born in the United States automatically become citizens. In a generation or two, these children will presumably be fully assimilated Americans. During a visit to New York for the United Nations General Assembly meeting, a former president (not the one with the ukulele) gave a talk at Columbia; I asked him in the public forum whether they have any plans to evacuate. He firmly said no – they are staying. That is the stated policy of every island nation; it seems to be politically toxic everywhere to admit that the homeland will have to be abandoned because it is going under the seas. But many in the Marshall Islands and the two other countries with similar agreements with the United States (Micronesia and Palau) are undertaking informal migration.

No other country endangered by sea level rise has such a deal. My work with the Marshall Islands led me to look more broadly at the issue of climate-induced migration. Coming up with estimates of the number of people who will be displaced by sea level rise, drought, and other extreme events worsened by climate change is very difficult; we don't know how much GHG concentrations will rise in the decades to come, and much migration is due to a combination of factors: climate change, political and ethnic conflicts, and high unemployment, among others. The estimates vary widely, but it is broadly (though not universally) accepted that by the end of the current century, at least one hundred to two hundred million people globally may be displaced largely as a result of climate change.

These people are not legally classified as refugees. That term applies to people who are forced to flee their home countries as a result of persecution or the reasonable fear of persecution. Climate change does not count. Countries have no obligations to take them in. (As the appalling experience at the southern border during the Trump administration has shown, even people with a colorable claim to refugee status will not always be treated humanely.) A just solution might be for each major emitting country to take in a number of climate-displaced people roughly proportional to its share of the greenhouse gases in the atmosphere. The

United States is now responsible for about 25 percent of the load of GHGs. (China contributes more on an annual basis, but GHGs last so long in the atmosphere – carbon dioxide, more than a century – that their cumulative load has not yet caught up to the United States.) If one hundred million people are displaced, it's easy to do the math on how many people we should take in. But the politics of this are completely impossible – certainly now, but perhaps in any imaginable future.

The number of people in the small island states is small enough for the international community to absorb them. But what will happen if and when tens of millions of people in Bangladesh need to escape the rising seas and saltwater intrusion into their water supplies, at the same time that millions of people on the coastlines of India, Pakistan, and Myanmar are also moving inland for the same reasons, and perhaps millions more are displaced because the retreat of the Himalayan glaciers due to global warming is drying up the rivers that people need for their water? The history of South Asia does not suggest that the Bangladeshis will be accepted with open arms by their neighbors, who are themselves in great distress. And this is on a subcontinent with two countries with nuclear weapons. When people ask me what about climate change gives me nightmares, this is at the top of the list.

One of the great frustrations for lawyers is that there seems to be little that our legal systems can do to address this looming migration crisis. A core principle of international law is that states cannot be compelled to join treaties without their consent. Several NGOs and academic groups have drawn up model agreements on internal and cross-border migration (and my Columbia center has participated in some of this), but so far no major countries have agreed to be bound by these treaties. Human rights tribunals can make findings and issue reports, and many of them have already done so with respect to climate change, but almost none of them have the legal authority to compel remedies or award damages. The United Nations can urge action, and in 2015, I addressed a special meeting of the UN Security Council calling on them to do that. The world's religious leaders can call upon their followers to behave justly toward their fellow humans, and in 2016, I spoke about climate displacement at a conference in Vatican City convened and attended by Pope Francis. We can raise our voices in these forums and hope to move some minds. But neither the UN nor the pope can force action. That power lies within each country's own government, and tragically, the global tide of right-wing populism has led several countries (led by Trump's America) to abandon any compassion for suffering outside their borders, or by disfavored populations within their borders.

Mass migration may be the worst impact of climate change. But over the past decade, I have also worked on its causes and on how to cope with its other impacts.

The root cause of anthropogenic climate change is GHG emissions. In the United States, about 75 percent of that comes from the combustion of fossil fuels. (Most of the rest is due to industrial processes and agriculture.) So the core task in fighting climate change is reducing the use of fossil fuels.

In 2011, the American Bar Association published a book I had edited, *The Law of Clean Energy: Efficiency and Renewables*. I teach a course on energy regulation and emphasize these subjects, but my greatest engagement with them came after the publication of a series of reports in 2014 and 2015, *Pathways to Deep Decarbonization in the United States*, from the Sustainable Development Solutions Network (SDSN, which is associated with Columbia) and the Institute for Sustainable Development and International Relations (IDDRI, based in Paris). These reports laid out in considerable detail how the United States could radically reduce its GHG emissions. There were three pillars: energy efficiency; decarbonization of the electricity sector (meaning no more use of coal to make power, or natural gas without carbon capture and sequestration, and major increases in renewable energy and possibly nuclear energy); and conversion of most uses of liquid fuels (led by transport and by space heating and cooling) and gaseous fuels to renewables.

I began asking the question of how U.S. law needs to change to be on this pathway. I learned at a conference that another law professor, John Dernbach of Widener Commonwealth Law School in Harrisburg, Pennsylvania, was asking the same question. So John and I decided to team up and coedit a book that would address the question. We divided up the recommendations in the SDSN/IDDRI reports into more than two dozen chapters. We then added several topics that those reports had not included in any detail, including agriculture, forestry, carbon taxes, materials consumption, non-carbon dioxide GHGs, and several others. We set about to find legal experts – mostly law professors but also some practitioners – to write the chapters. We started in mid-2015 and hoped to finish the book in time to present it to an incoming Hillary Clinton administration. But neither our timing nor the 2016 election turned out as we hoped. The end result was finally published in April 2019 by the Environmental Law Institute (ELI) as a nearly 1,200-page book, *Legal Pathways to Deep Decarbonization in the United States*, with thirty-five chapters by fifty-nine authors. This was entirely a pro bono effort; John and I waived royalties, the chapter authors all worked for free, and ELI sells the book below cost.

The book has more than one thousand recommendations. John and I didn't want it to simply sit on the shelf, so we enlisted Richard Horsch, who had recently retired as an environmental partner at the law firm of White & Case, to lead an effort to recruit pro bono law firms to draft the model laws recommended by the book. More than twenty law firms have signed up, and we're looking for more. Other lawyers have volunteered to serve as peer reviewers for chapters in their areas of expertise. Marcy Kahn, who just retired as a justice of the New York State Supreme Court, Appellate Division, has agreed to lead that peer review effort.

Joseph DiMona, who recently retired as a corporate general counsel, is helping lead what we see as the next stage: pushing our model laws out to Congress, state legislatures, city councils, and other bodies with the authority to enact them. We are also working with law professors in Brazil, the European Union, and Australia to try to replicate our project in those places.

This project has revealed several things about the law and about lawyers.

First, about the law. There are many legal tools that can be used to advance the decarbonization effort. These include regulatory mandates; incentives; information provision; clearing away legal obstacles; market mechanisms; and many others. A price on carbon, such as through a carbon tax, would be very helpful. But (contrary to the views of some economists) it would not be enough; there are many problems that a carbon tax alone cannot solve. The legal tools need to be deployed at every level – federal, state, and local – and the executive, legislative, and judicial branches must be engaged at each level. So must corporate and NGO board rooms, mass and social media, and others. The different economic sectors and technologies that emit GHGs are so varied that one size does not come near to fitting all.

Second, about lawyers. A great many lawyers are yearning to deploy their professional skills to fight climate change. This ranges from law students and junior associates to retired partners. Environmental and energy lawyers have the most obviously relevant expertise, but these are also the most likely to have client conflicts in undertaking this work. But lawyers in such transactional areas as corporations, finance, taxation and real estate, and many others have much to contribute. Big law firms mostly represent big companies – that’s who can pay their big fees – but we’ve usually found ways to navigate the danger of client conflicts. A law firm that represents oil companies, for example, would not want to draft the laws that directly hit oil companies (leave those to other firms), but might be fine with working on energy efficiency or on renewable energy, for example.

The SDSN and IDDRI reports were eye opening in another respect. If we transition to all-electric passenger cars, switch space heating and cooking to electricity, and follow the other recommendations on electrification, we need to about double the nation’s electricity supply, even after an aggressive program of energy efficiency. When we also shut down all the coal plants and most of the natural gas plants, and recognize that most nuclear power plants will be retiring and we’re unlikely to build any new ones in the next few decades, that means that a phenomenal number of renewable energy plants will need to be built: mostly wind and solar, but also some hydroelectric, geothermal, and others. This is a massive, nationwide, multidecadal construction endeavor. But many of these projects will be opposed by neighbors and others who don’t like the sight of wind turbines, the associated power lines, and other facilities. This “not in my backyard” opposition has proven to be a major obstacle to achieving the necessary scale of clean energy. (As noted earlier, I used to do a lot of opposition work myself, though not against

renewable energy projects.) So the Sabin Center has launched the Renewable Energy Legal Defense Initiative, which provides pro bono legal assistance to community groups and others that favor these clean energy projects that are facing local opposition. My old law firm Arnold & Porter joined in by seconding a litigation associate, Laura Cottingham, to spend half her time over a year working on this project and launching our first legal actions.

Regardless of our best efforts, the world will get a lot hotter in the decades to come. And we're not making our best efforts; despite all the UN agreements and pledges, the world's GHG emissions continue to climb. Thus, it is essential to help prepare for what's coming: more severe floods, heat waves, wildfires, droughts, disruptions of water and food supplies, and everything else.

Here, too, there is much the law can do. Flood maps, zoning codes, building codes, infrastructure specifications, insurance requirements, and many other tools are available. In 2012, the American Bar Association published *The Law of Adaptation to Climate Change*, edited by Professor Katrina Fischer Kuh and me, that explores these legal tools in detail.

Hurricane Sandy hit in October 2012, shortly after this book appeared. It caused widespread electricity blackouts. The Sabin Center petitioned the New York Public Service Commission to require all the utilities it regulates to devise plans to prepare for future climate-related extreme weather events. Shortly afterward, New York City's electricity provider Con Edison filed for its next rate increase, which included \$1 billion for storm hardening. This would help prepare for the next Hurricane Sandy, but there are many other extreme events that could harm the electricity system, such as heat waves. So we brought some Columbia climate scientists before the top executives of Con Edison to explain the latest projections. The company is run by engineers who understand math and who value electric system reliability above almost all else; they got it. We then formally intervened in the rate case and participated in a negotiation process that was expertly presided over by an administrative law judge, Eleanor Stein. (In 1969, she had left Columbia Law School after being jailed for antiwar activities. Some things come full circle.) The talks led to a settlement agreement under which Con Edison hired outside climate scientists to prepare projections about future climate conditions in their service territory; examined how those conditions could affect system reliability; and devised ways to prepare for and cope with those conditions. Con Edison (after some startup delays) did the required studies and is now preparing the plan to implement the recommendations.

This is one particular example of how legal processes can be used to help prepare for climate change. Not enough of this kind of work is being done. It's less glamorous than suing oil companies, and it tends to promise no more than local benefits, but it will be an important part of coping with the hot world to come.

The term geoengineering is much used and often vilified. But it really involves two quite separate kinds of activities. The first is absolutely essential, and might be done with little risk, though at great expense. The second is terrifying and risky, but regrettably I think someone is likely to try it, and it doesn't cost that much.

The first is carbon dioxide removal: taking out some of the carbon dioxide that is already in the atmosphere, and either storing it temporarily, as in trees, or permanently, as in geological sequestration, or using it, as in some building materials or fuels. The recent scientific reports make clear that carbon dioxide removal will be needed on an utterly massive scale. Many technologies are being developed (though not nearly enough money is going into the necessary research, in view of the importance of carbon dioxide removal in the overall climate picture). These technologies all raise legal issues, but none of them seem insurmountable. For example, my Sabin Center colleague Romany Webb and I, along with scientists at Columbia's Lamont Doherty Earth Observatory, are working on the legal issues surrounding the long-term storage of carbon dioxide in basalt formations under the Atlantic and Pacific Oceans. Some laws would need to be changed to allow this to happen, but it's not difficult to imagine what these would look like.

The second kind of geoengineering is solar radiation management: reducing the amount of sunlight hitting the earth. The most likely technique would be using a fleet of airplanes to spray aerosols into the stratosphere. We know from volcanoes that this could reduce global temperatures a degree or two, which would make a big difference to the climate. But there is real concern that it could disrupt natural systems and weather patterns in unpredictable ways, and if things went wrong, could have extremely negative impacts on some regions of the globe. Already several Hollywood films have painted some dire scenarios.

I liken solar radiation management to chemotherapy for the planet. If you're dying of cancer, you may agree to inject toxic chemicals into your body: they will make you very sick, your hair will fall out, they may kill you, but they may also save your life. If the earth is facing crucial tipping points – which some scientists believe may already be happening – it may be rational to take risky steps that have the potential to avoid some of the worst impacts of climate change. However, here the legal issues are very difficult, even at the conceptual level. Who would have the power to undertake this effort? How much certainty about necessity, risks, and benefits should be required before deployment could begin? If something goes wrong, who pays? How would it be determined whether a given negative weather event in some part of the world is caused by the solar radiation management or by natural systems? If some rogue actor were to deploy this technology without the necessary international authorizations (if such were required, which they're not yet), how would a decision be made to stop it, especially if military force is required?

In 2018, Cambridge University Press published a book that I coedited with Tracy Hester, *Climate Engineering and the Law: Regulation and Liability for Solar Radiation Management and Carbon Dioxide Removal*, which explores these issues in depth. Perhaps because of this, the Harvard University provost's office invited me to join the advisory committee for an experiment that some Harvard scientists have proposed, called SCOPEX, that would involve launching a balloon into the stratosphere, spraying a small amount of nontoxic material (probably ice and calcium carbonate), and seeing how it behaves. This project itself would have no environmental impact, but it would inform future thinking about whether solar radiation management could actually work, and if so, how. I accepted the invitation because I fear that the planet might need this kind of chemotherapy some day, and also because it's entirely plausible that some country or nonstate actor will try it regardless of international opinion, and it's important to know as much as possible about the likely positive and negative impacts.

Shortly after the membership of this advisory committee was announced in August 2019, we all received a petition, signed by quite a few (mostly small) environmental groups around the world, urging us to resign. The two main reasons given were that deployment of solar radiation management could be dangerous, if something goes wrong, and that the potential availability of this technique poses a moral hazard: a danger that countries and companies will use it as an excuse not to do everything possible to reduce their GHG emissions. None of us have resigned. As to the first reason, the experiment itself is tiny; so far as we can tell, it cannot possibly have negative environmental impacts. We do not yet know enough to assess the risks of full deployment; the proposed experiment may give us a better handle on what they are. It will not lock us into anything. As to the second reason, we haven't seen any evidence that discussion of solar radiation management is actually impeding serious efforts to reduce GHG emissions. A decade ago, it was taboo in many circles to talk about adaptation to climate change, because of the same moral hazard concerns; that argument has mostly gone away with greater recognition of the necessity of adaptation. We think the same thing may happen here. But the advisory committee is still in the early stages and we have reached no conclusion about whether to recommend that the experiment proceed.

The Sabin Center attempts to track all the climate change litigation in the world (by which we mean lawsuits that explicitly raise climate change as an issue). By our latest count, there are more than 1,452 such cases in thirty-seven countries. The United States is by far the leader, with 1,134 cases; Australia is a distant second with ninety-five. Most of the lawsuits are about specific facilities or regulations, but a handful attempt to be a "silver bullet": that is, an effort to address a country's GHG emissions all at once.

One such lawsuit has succeeded: *Urgenda Foundation v. Kingdom of the Netherlands*. In December 2019, the Dutch Supreme Court upheld rulings of the lower courts that the European Convention on Human Rights obligates the Dutch government to reduce the country's GHG emissions even further than its pledge under the Paris Climate Agreement. This is the only court case in the world that, without benefit of a specific legislative statute, required the government take stronger action on the causes of climate change. This litigation has inspired similar lawsuits in several other countries; so far none have succeeded, but a few are still pending.

There have been several such lawsuits in the United States. Most have been dismissed, but the one that got the furthest was *Juliana v. United States*, brought to federal court in Oregon in 2015 by twenty-one young people claiming that an ancient legal doctrine, the public trust doctrine, requires the government to protect the atmosphere from dangerous climate conditions, and that this requirement is embedded in the due process clause of the Constitution. This theory is highly controversial among legal academics, but the suit inspired much hope (and fundraising). The suit did not go as far as *Urgenda*; it sought a court order that the federal government produce a plan to radically reduce emissions (one step removed from actually reducing emissions). However, in January 2020, a divided Ninth Circuit Court of Appeals rejected the lawsuit. The court was convinced that climate change causes a grave danger and that humans are mostly responsible, but the majority found that the courts were powerless to act; solving the problem (which the dissenting judge likened to an asteroid hurtling toward Earth) was the job of Congress and the executive branch. The plaintiffs have vowed further appeals but the odds seem slim, especially with the current Supreme Court.

Fifteen lawsuits have also been brought under state common law against fossil fuel companies, mostly by cities, counties, and one state (Rhode Island) seeking reimbursement for the costs of adapting to climate change, such as the construction of sea walls. In 2011, the Supreme Court dismissed a similar lawsuit brought under federal law; a major issue in the current cases is whether that decision governs these cases brought under state law. So far the courts are split on that issue, and the Supreme Court has been asked again to weigh in.

Climate change litigation is burgeoning around the world. Because governments and legislatures everywhere have failed to take adequate action, activists are looking to the courts. Lawyers are scrambling for legal theories that might be available. Apart from the many legal niceties that impede success in these cases, there is a fundamental set of interrelated problems. Should unelected judges be able to override the decisions of elected officials? What is the appropriate separation of powers among the branches of government? Does the fundamental threat that climate change poses to humanity empower the courts to override the other branches, and if it does, how will the courts enforce their rulings? Who should be able to make the necessary trade-offs among the economic interests of the coun-

try where the court sits, the interests of other nations, and the interests of future generations? Faced with these difficulties and many others, almost all judges have decided that this isn't their role.

In the United States, the courts have played an essential role in making sure that the federal government obeys the laws that Congress has written. In 2007, in the landmark case of *Massachusetts v. EPA*, the Supreme Court (by a 5–4 vote) overruled the position of the George W. Bush administration that the EPA lacked the power to regulate GHGs. The Obama administration used that ruling to move forward on climate action, but in 2016, the Supreme Court (by another 5–4 vote, but going the other way) halted the most important effort, the Clean Power Plan. The courts have blocked numerous efforts by the Trump administration to dial back environmental protections, but mostly on procedural grounds. The statutes are still in place, but they are getting very old. Congress has not passed a major environmental law since 1990 (with the sole exception of an industry-supported toxics law in 2016); partisan divisions since then have blocked any new laws. So the courts are mostly reduced to enforcing laws written a generation ago, before the perils of climate change were so apparent.

There may be no legal silver bullet that will solve the problem in one shot. Even *Brown v. Board of Education* (1954), the best-known Supreme Court decision calling for a fundamental shift in a core aspect of society, did not lead to much actual school desegregation until Congress and Presidents Kennedy and Johnson took action a decade later. But there are hundreds or thousands of silver buckshot: smaller legal actions at every level that can add up to significant progress in avoiding the worst impacts of climate change and coping with those that do occur. Finding suitable targets amidst a galaxy of possibilities and shooting that buckshot are the best that we lawyers, as lawyers, can do. As citizens, we could have an even greater impact by helping elect a president, a Congress, and state and local officials who will, at last, take the needed actions.

This all became much more personal for me in April 2018 when Barbara and I were blessed by the arrival of our first grandchild. Our second came in August 2020. Today, nothing motivates me to fight climate change more than holding our Amelia and her little cousin Neri, who should still be around in 2100, and thinking about what kind of world they will live in. I don't know if my professional work will actually help give them and their generation a better world, but it is profoundly satisfying to know that I'm trying my best.

ABOUT THE AUTHOR

Michael B. Gerrard is the Andrew Sabin Professor of Professional Practice at Columbia Law School and Director of the Sabin Center for Climate Change Law. He is a former Partner and currently Senior Counsel to the law firm of Arnold & Porter. He has chaired the faculty of Columbia's Earth Institute and the Section of Environment, Energy and Resources of the American Bar Association. He is the author or editor of thirteen books on environmental law.