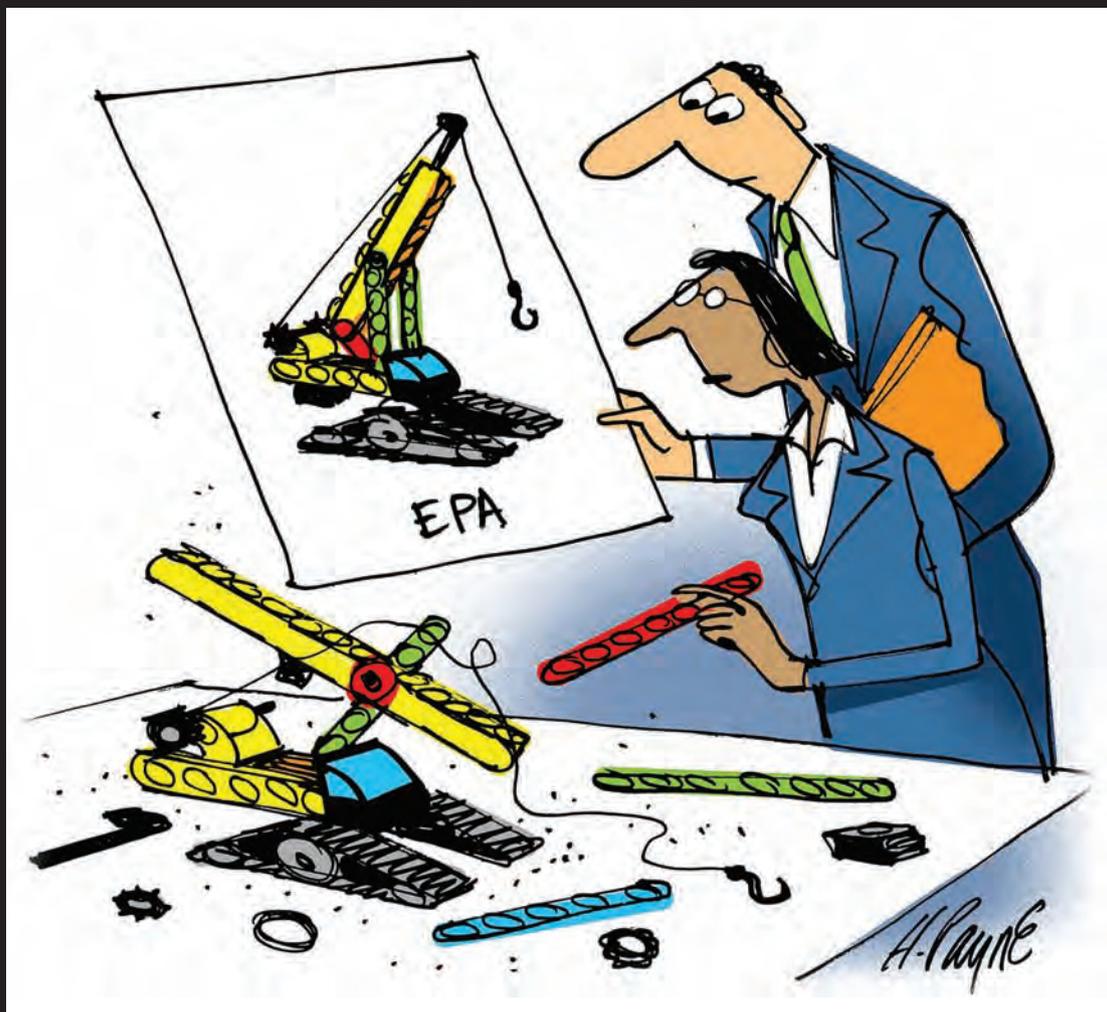


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Environmental Information Research, Access & Environmental Decisionmaking

By Sarah Lamdan

In an ideal world, environmental information would be easy to find and use. But the current state of environmental information access requires additional knowledge and expertise—the kind that this book provides.

Designed for legal practitioners, librarians, journalists, advocates, students, and researchers, this book helps environmental information seekers locate, obtain, and make sense of environmental records, documents, and pieces of data. It contains tips and concepts that expand beyond legal research or general research and into the broader realm of information-gathering. The book discusses environmental research tactics and resources and it also covers methods for obtaining information from nontraditional sources like government offices and open meetings.



About the Author

Sarah Lamdan is an Associate Professor and librarian at the City University of New York School of Law. Sarah specializes in government information access and transparency with a focus on environmental agency records, and she teaches legal research, advanced legal research, and lawyering skills courses.



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“No Ordinary Lawsuit”

LEAD FEATURE 🌱 Youth plaintiffs in Oregon are suing the federal government for climate inaction — one of many similar suits around the country and the world. Litigation based on the public trust doctrine can be difficult to win, but Millennials are speaking out about an issue that profoundly affects them.

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THE DEBATE IN PRINT

Is It Time to Consider Geoengineering the Planet?

Scientists around the world have begun to hedge their bets and not count on society’s decarbonizing in time to avoid disruption to the Earth’s climate. Enter a once-taboo topic shunned by greens and governments alike — geoengineering, a suite of suggested technological remedies to solve the climate crisis or at least buy humanity more time to rid its energy and agricultural systems of greenhouse gas emissions.

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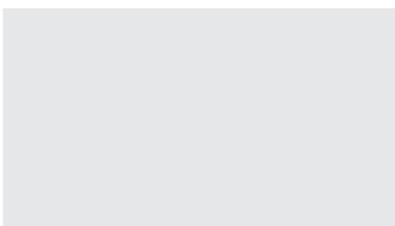
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“Losing Earth”

The Golden Moment for Climate Change

By Oliver Houck

“For of all sad words of tongue or pen,
The saddest are these: “It might have
been!” — JOHN GREENLEAF WHITTIER

The saddest words of tongue or pen attend what happened with America and climate change. This is the thesis of Nathaniel Rich’s provocative history, published on line and as the sole article in its Sunday magazine with stark photos and considerable fanfare by the *New York Times* as “Losing Earth: The Decade We Almost Stopped Climate Change.” It is as well-grounded as any narrative today and it reads like a pop thriller, shaping a story that has already begun to reshape the world . . . the rest of the world be damned. For better or for worse, America owns this one.

Rich dispenses with what we know about climate change today in a prologue. It is a grim stage. In recent decades we hoped to arrest the phenomenon by 2020, then by 2050. As it now stands the odds of limiting a rise in global temperatures to 2 degrees Celsius are only 1 in 20, at which point the tropical reefs are extinct, sea levels are up several meters, and coastal development on every gulf is no longer tenable. That may be the best case. As the phenomenon hits 4 degrees from various feedback loops, we have Europe in permanent drought and entire subcontinents of desert, including the American southwest.

Although the vastness of these impacts is newly appreciated, their mechanics have been an open secret for a long time. Scientists were predicting global warming since the rise

of industrial Europe over a century ago, coal emissions blackening households along the way and eating away at stone buildings. Today the greenhouse effect is found, as Rich writes, in any *Introduction to Biology* textbook (unless deleted by state agencies). To which America, with the world in tow, was at least facially responding . . . until suddenly it wasn’t. What happened?

The focus in this sense is narrow, from 1979, when American responses seemed on course, to 1989, when, as if by wand, they went off the radar. Each succeeding chapter, as punchy as



“Losing Earth: The Decade We Almost Stopped Climate Change,”
By Nathaniel Rich. Photographs
and videos by George Steinmetz.
New York Times Magazine and
online, August 1, 2018.

a short story, tracks a few major players and their pieces of the frame. They include Rafe Pomerance, a broadly skilled environmentalist who fell into the issue and never left it; James Hansen, the NASA scientist, quiet, unassuming, and deadly factual, who would become the bete-noir of climate change deniers; Al Gore, then in the House of Representatives, who made climate change the driver of his political life; John Sununu, President George H.W. Bush’s chief of staff, who had quite different ideas (including of his own expertise); industry chiefs and

agency heads who saw threats to their missions; and the ever-present Office of Management and Budget, which went so far as to neuter Hansen’s testimony to Congress and then rewrite parts of it out of whole cloth. (Hansen would present the edited testimony and then reveal both the intervention and its inaccuracies — which caught headlines.) In short, a preview of the war and tactics that would dominate U.S. climate policy ever since.

Rich describes these events with wit and depth, but never quite answers his own question. Sifting through the narrative it seems to have been a perfect storm, unwittingly abetted by a blue-ribbon National Academy of Sciences panel asked to determine both what was happening and appropriate responses. True to the caution of their discipline, however, sensitive to the slightest unknown, after three hard days of dialogue its members could not even agree that the situation was “urgent,” only that it “could be.” Somewhere buried in their report were alarming data, but the take home was that science was working on it, and in any event nothing very bad was going to happen very soon. Which of course is what made the evening news. Ironically, an exercise intended to elevate the issue freed Americans to stop worrying about it instead and return to the backyard grill.

At the same time, throughout the 1980s President Reagan was making government a dirty word. For their part, the carbon industries, led by oil and gas, turned hostile to the issue as soon as it became apparent that they were in the bullseye and would be expected to change; changing the most profitable enterprises in the world was not exactly their business model. National leadership then fell to President Bush, who had apparently decided to put climate change into his campaign after seeing something about it in a

magazine. When push came to shove, with his EPA urging action, he left the field to Sununu. As a colleague told Administrator William K. Reilly, “You can’t win against the White House,” and he didn’t. Exactly what lesson can be drawn here is rather opaque. What seemed extraordinary then, from testimony-tampering to quashed initiatives and pandering to Big Oil, seems par for the course today — even mild.

The blowback to this piece has been considerable. It was encouraged by the very title of its promo video, “Almost nothing stood in our way — except ourselves.” As if to confirm the *we’re all to blame* implications of this statement, Rich goes on in an epilogue to conclude: “It’s not the oil industry; it’s not Republicans, it’s not capitalism: it is all of us. It’s democracy. It’s the human species.” At which point he has exculpated even the most self-interested climate change deniers, and thrown up his hands. As the author Naomi Klein writes in a response to Rich in the *Intercept*, “Capitalism Killed Our Climate Momentum, Not ‘Human Nature.’” It is simply wrong to use the royal *We* to describe “a screamingly homogenous group of U.S. power players.” They, and not all that many of them, were at the controls, not us.

Another response entitled “How Not to Talk About Climate Change” also takes Rich to task for failing to pin the tail on the very donkeys identified in his piece. It was the oil industry, which had in fact begun undercutting climate initiatives at the same time Rich saw them on-board, and soon went viral with one of the most successful disinformation campaigns in American history; it was the Republicans under the lead of Sununu and, later, the second President Bush’s vice president, Dick Cheney, who made carbon fuels a national priority and la-

beled energy conservation an obstacle to progress; it was unregulated capitalism that rose to promethean heights in the 1980s, removing all obstacles in its way, and again in the 2000s, and again today. It was Grand Old Party politico-linguist Frank Luntz, who a few years later would advise party leaders on a winning strategy: as the science on climate change was closing in, they needed to inject uncertainty into the debate. “A compelling story, even if factually inaccurate,” he noted, “can be more emotionally compelling than a dry recitation of the truth.” *Even if factually inaccurate* — how prescient.

The fact is that U.S. action on climate change was not killed in the 1980s, and although Rich’s “golden moment” was lost, there was never reason to believe that meaningful responses would come easily, if at all. Indeed, it is all the more remarkable that U.S. initiatives survived and came back off the mat, twice, only to suffer setbacks equally abrupt and yet more bizarre.

The first came in the 2000 election, in which the most visible and outspoken advocate for climate action on the national scene lost the presidency of the United States to

a Supreme Court decision so tinged with politics and based on reasoning so flakey that we are admonished never to cite it as precedent.

The second came in 2015, when every nation on the planet, to even their own surprise, signed onto the Paris Agreement that set the stage for worldwide carbon reductions, only to run into a U.S. presidential candidate who claimed climate change a hoax and, with the aid of well-timed interventions from the Russian government and ill-timed statements from the FBI, would win office by a whisker later that year. Following which America has announced it will withdraw from the agreement and taken every step possible (some of questionable legality) to eliminate domestic climate change controls.

It was a decade when
America almost
grasped a problem
haunting us now

And yet, as an issue, it cannot die. California is on fire, the Southwest is already a dry canteen, Louisiana is sinking like a shipwreck, natural cycles have lost their clocks (as the Cree say, “The geese have lost their way”), and the big changes have yet to come. Rich has written a gripping narrative backgrounding this, and to be fair his epilogue alludes to much of it, but he ends with no more satisfactory an explanation than “human nature” — as if the strong positions taken on climate change in Europe, Latin America, and even Africa come from another species. Perhaps he, too, became overwhelmed by its enormity and ended up blaming all of us. “Losing Earth” is, nonetheless, a deep plunge and an important read. Rich is a gifted writer, but has he finished the job?

In his prologue, Rich calls the “inaugural chapter” of the climate change saga “Apprehension,” our understanding of the phenomenon. He identifies a second chapter called “The Reckoning,” the meaning of which is less clear. If it consists of a one-decade foray into what happened, then “Losing Earth” becomes, at journey’s end, simply a well-written lament. If, however, he means a reckoning of responsibility, then he has failed to close. One of these days a lawsuit is going to break through the impasse (current decisions notwithstanding, damage claims in tort and fraud are not “political questions”), or a state like California will (and it is trying), or a rising generation (also trying), or perhaps something as bizarre as what we have now going on in Washington, and I hope Rich is on hand to describe it. He is clearly primed.

To me, at the least a reckoning means people and institutions are taken to task. This has yet to happen. Until it happens, there will be no reckoning at all. “Losing Earth” is a great start, but blaming “human nature” doesn’t count.

Oliver Houck is professor of law at Tulane University. He can be reached at ohouck@tulane.edu or www.oliverhouck.com.

Best of the Books: Reflections on Recent Literature in Natural Resources and the Environment

By Oliver A. Houck and G. Tracy Mehan III

Lively wit and wisdom from the books columnists of *The Environmental Forum*, the policy journal for environmental professionals.

Best of the Books is a series of 60 essays and book reviews originally published in the Environmental Law Institute's policy journal, *The Environmental Forum*. Written by columnists Oliver A. Houck and G. Tracy Mehan III, both long involved in the development of environmental policy, this anthology provides thoughtful and insightful pieces that reflect on where we are now in the struggle to harmonize human impacts with life of the planet.

As William D. Ruckelshaus, the first U.S. EPA Administrator, writes in the foreword:

"If you find yourself interested in the environment and thirsting for more information about what is meant by being an environmentalist, this is the book for you. If you want to understand the multitude of complex issues raised by different players in the debates—heroes and villains—then read on. What you will find is the rich and fascinating unfolding of a movement that in its modern form is now over 50 years old."

Best of the Books will serve as an excellent source for anyone needing a canon of recent literature on the modern environmental movement and the legal structures supporting it.

About the Authors

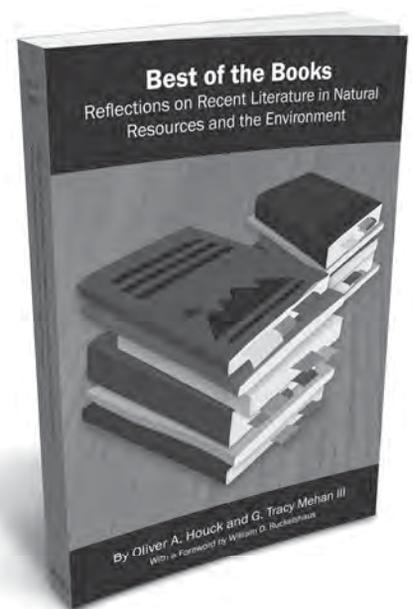
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"As Dante encountered Virgil to guide him through the afterworld, readers in this world should use Houck and Mehan as guides to locate and enjoy the best of contemporary environmental writing. This book is a splendid read."

—Bruce Babbitt

Former U.S. Secretary of the Interior (1993-2001) and 16th Governor of the state of Arizona (1978-1987)



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The Agency's Proposed "Science Transparency" Rule Is Opaque

When Acting Administrator Andrew Wheeler gave his first speech to EPA staff on July 11, he stated that clear, consistent risk communication — which he accurately described as an activity “that goes to the heart of EPA’s mission” — was his top priority. That being the case, Wheeler would do well to carefully review the many skeptical comments from risk experts and the scientific community on the agency’s proposal for “strengthening transparency in regulatory science,” a reality check that would reasonably lead him to either radically revamp or abandon the flimsy proposal.

Although the scientific community broadly understands the need for transparency and the ability to replicate data that support risk conclusions, for many commenters, the bottom line is that the proposal isn’t transparent enough.

That’s true not only for the proposal’s many critics but even for the American Chemistry Council, the national chemical industry trade group, which supports the proposal. According to ACC, “key regulatory definitions and regulatory text” in the proposal aren’t clear enough, the preamble needs clarification, and the proposal doesn’t always properly identify the sources of statutory authority it cites, among other issues.

For the Society of Toxicology, whose work is vital to the chemical risk assessments that Wheeler and EPA would communicate, the proposed rule “is too simplistic.” Among other issues, SOT says, an independent scientific body — not the EPA administrator — should decide whether studies whose data are not publicly available would be valid and valuable for a regulatory decision. Rejecting the proposal’s notion that data should be invalidated solely on the basis of public availability, SOT

cautions that excluding studies conducted before electronic storage “would invalidate hundreds of thousands of studies” that are extremely important for chemical risk assessments for tens of thousands of chemicals.

Comments from Harvard Law School signed by almost 100 experts from top hospitals and public health organizations note that EPA’s own guidelines require the best available science in all risk assessments and warn that the proposal would “cripple EPA’s ability” to implement major environmental laws by excluding “for no rational reason” many valid studies. And, citing a litany of complex risk- and science-related issues raised by the proposal, the presidents of the National Academies of Sciences, Engineering, and Medicine write: “Much more clarity is required.”

Echoing numerous other comments, the Defense Department notes that it is “improbable” EPA will always obtain a study’s underlying data, but that shouldn’t prevent the use of “otherwise high-quality studies.”

William Farland, who served in senior scientific advisory roles during his 27-year career at the agency, notes that since the 1990s critics have alleged that EPA uses “secret science” to support regulations, allegations that have motivated the transparency rule. But, despite a long history of such claims, none have withstood scrutiny.

EPA needs to provide more information on how decisions will be made about studies that can and can’t be used, Farland says, citing the National Academies’ call for an objective, independent scientific review process to evaluate individual studies. In a process going well beyond the administrator’s simply giving an exemption, EPA could systematically review research, using published review criteria, to determine if studies should be used. The rule speaks to the

Potentially invalidating
tens of thousands
of prior chemical
risk assessments



David P. Clarke is a writer and editor who has served as a journalist, in industry, and in government. He can be reached at davidpaulclarke@gmail.com.

critical issue of when data can be used to support dose-response analysis, but “there needs to be more detail” on the specific uses of such studies before EPA’s risk community could implement the proposal, Farland adds.

Wheeler’s commitment to better risk communication notwithstanding, communication “will continue to be an issue,” Farland says. Agency scientists conduct detailed risk analyses, but regulatory programs say “just give me the number,” an issue EPA has struggled with over the years. Prior to deciding on how to regulate coal-plant mercury, Administrator Mike Leavitt — who served from 2003–05 — at times spent six hours a week learning from agency scientists about the toxin’s risk, a process that enabled good risk communication. Likewise, Wheeler needs to delve deeply into the science supporting regulatory decisions if he wants to accomplish good risk communication, Farland says.

Going forward, Wheeler will have to decide how he’ll respond to an EPA Science Advisory Board request to review the rule. In a June 28 letter, the board commented that the rule’s design “appears to have been developed without a public process” for soliciting the scientific community’s input, although the proposal entails numerous important science issues.

Ultimately, Wheeler can’t separate risk communication from risk science, but for a start he can clarify the agency’s proposed solutions to what may be a non-problem.

Climate Justice

Case Studies in Global and Regional Governance Challenges

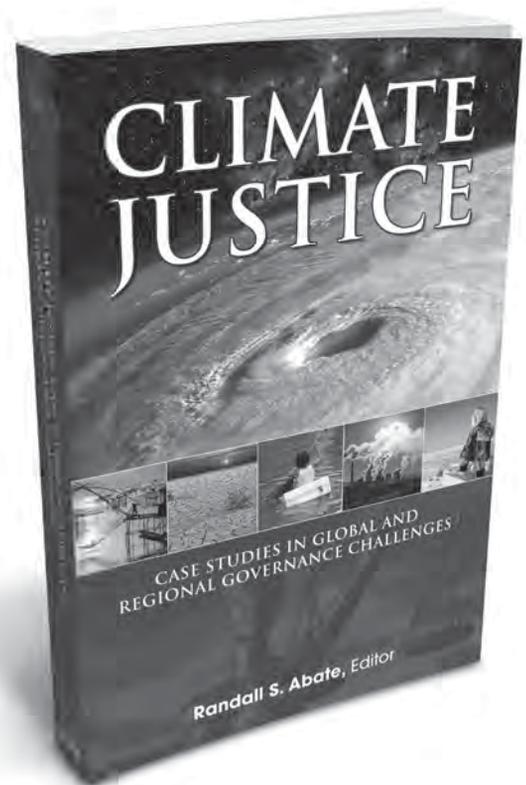
Randall S. Abate, Editor

Climate change is one of the most complex political, social, and environmental issues of this century, and climate change adaptation has become an increasingly large focus of global efforts. The international community's attention on adaptation has been primarily focused on developing countries' needs, with consensus that the world's most vulnerable communities—the urban and rural poor, low-lying island nations, and indigenous peoples—require additional protection. It was in response to this need for equity that “climate justice” emerged.

Climate justice can be defined generally as addressing the disproportionate burden of climate change impacts on poor and marginalized communities. It seeks to promote more equitable allocation of the burdens of these impacts at the local, national, and global levels through proactive regulatory initiatives and reactive judicial remedies that draw on international human rights and domestic environmental justice theories. Yet, efforts to define climate justice as a field of inquiry can be elusive and underinclusive because the concept is so vast in scope.

CLIMATE JUSTICE: CASE STUDIES IN GLOBAL AND REGIONAL GOVERNANCE CHALLENGES seeks to fill that void, providing an overview of the landscape of climate justice from a variety of legal and geographic perspectives in a case study format. Drawing on the expertise of 30 contributors from 16 countries, the book analyzes climate justice from an international law perspective and from the perspectives of legal responses to promote climate justice in several regions of the world, including Pacific island nations, South Asia, North America, Africa, and the Middle East. It addresses proposed solutions to a range of regulatory obstacles under international law, U.S. law, and foreign domestic law in seeking to promote climate justice on a global scale.

Randall S. Abate has published and presented widely on environmental law topics, with a recent emphasis on climate change law and justice. He is the editor of *WHAT CAN ANIMAL LAW LEARN FROM ENVIRONMENTAL LAW?* (ELI Press 2015) and *CLIMATE CHANGE IMPACTS ON OCEAN AND COASTAL LAW: U.S. AND INTERNATIONAL PERSPECTIVES* (2015), and co-editor of *CLIMATE CHANGE AND INDIGENOUS PEOPLES: THE SEARCH FOR LEGAL REMEDIES* (2013).



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Recycling Increases in Red States, but Blue States Still Recycle More

What does a decade of survey data tell us about household recycling trends? Nationally, recycling rates increased by seven percentage points from 2005 to 2014 for households that recycle plastic, paper, cans, and glass.

Researchers Kip Viscusi, Joel Huber, and Jason Bell, who mined data collected from over 170,000 households in an effort to understand the factors that influence recycling behavior, were surprised by the upward trend. They reasoned that states did not enact major changes to their laws that could account for the increased recycling rates during the decade studied. Furthermore, economic factors such as the 2008 recession reduced Chinese demand for recycled materials, and reductions in the cost of producing new plastic (due to increased fracking) all limited states' financial capacity to support recycling.

Despite these impediments, the analysis shows that recycling behavior did increase overall, although rates varied

based on the type of material and geographic region. For example, can recycling rates were the highest (74 percent in 2014), but plastics recycling rates increased the most (11 percent). The researchers explain that the relative rates are affected by numerous factors, such as how often a household uses the material, the effort required to recycle, and whether local policies support recycling of specific materials. They also identified market factors that affected variations, such as the increased popularity of plastic water bottles.

The Northeast achieved the highest recycling rates — followed, in order, by the West, Midwest, and South. But despite leading the pack, rates in the northeastern and western states were fairly stable, whereas rates in the

Midwest and South grew substantially. Several factors influenced these regional variations including, but not limited to, the type of state legal regime and political party control.

For example, even though most states have some type of recycling law — almost all of which were enacted before 2005 — the stringency of the statutory requirements affected rates. The seven states with mandatory recycling laws, Connecticut, District of Columbia, New Jersey, New York, Pennsylvania, West Virginia, and Wisconsin, had the highest recycling rates — 67 percent on average. In contrast, the 21 states that either have no recycling laws — or laws that specify a goal but neither impose a mandate nor require plans or recycling amenities — had much lower rates. These states, which are located in all regions of the country and include Wyoming,

Indiana, Delaware, and Montana, had an average recycling rate of 41 percent. The researchers report that the greatest rate increases were in states with the least

stringent laws, even though the overall rates were highest in states with the most stringent laws.

In addition, states in which both the governorship and the legislature were controlled by Democrats recycled 30 percent more than in states controlled by Republicans. According to the researchers, political party control is associated with several factors that in turn affect recycling rates, such as the “prevalence of pro-environmental attitudes, population density, and state government spending levels.” The researchers conclude that their finding “is consistent with the emphasis by Democrats on government actions to further policy goals, contrasting with Republicans who value reliance on individual responsibility.” And, although



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Democratic states had the highest recycling rates, Republican states had the greatest increase in rates.

In what ways can these historical trends inform recycling efforts moving forward? According to Viscusi, the data indicate that amendments to state laws are unnecessary, as the statutes are broad enough to allow for program and policy changes that can make household recycling easier, such as curbside pickup and convenient drop-off locations. He further suggests that efforts should focus on states that do not have high enough levels of recycling, such as those in the South, which he concludes “have not hit a plateau” and have the “greatest opportunities for gains.” But, is increasing recycling rates in the South easier said than done?

Viscusi offers an approach: “Totally ignore the environmental benefits and focus on the economics.” The Viscusi team's prior research found that “sometimes recycling programs pass the cost-benefit test and sometimes they don't,” but in many cases recycling can be a “money maker.” He also queries whether corporations may appreciate robust recycling programs that may reduce the growing pressure to reduce or ban the use of plastics altogether.

Policymakers and stakeholders will undoubtedly rely on this study in shaping future recycling initiatives. The research's value highlights the need for more empirical and longitudinal studies to inform a range of state and local environmental policies.

Political party control is associated with factors that in turn affect recycling rates

Environmental Justice 4TH Edition

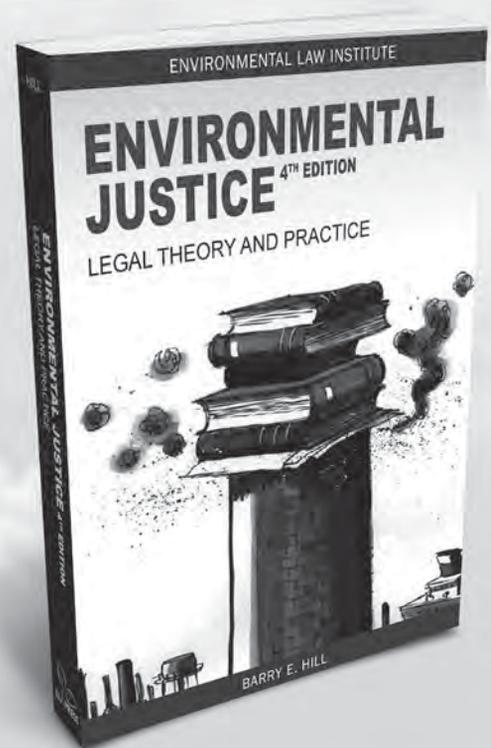
By Barry E. Hill

Race and socioeconomic status should not dictate the environmental health risks we face. Yet, too often this is not the case. The environmental justice movement seeks to avoid, minimize, and mitigate disproportionately high and adverse impacts on minority and/or low-income communities and to ensure that disadvantaged communities are engaged meaningfully in the environmental decisionmaking processes.

Environmental Justice: Legal Theory and Practice provides a thought-provoking exposition and comprehensive review of the complex mixture of environmental laws and civil rights legal theories that are central to this still-evolving area of law. The book, now in its 4th edition, includes all of the significant cases and developments that have occurred since the prior edition. Readers will come away with a deep understanding of the dynamics of environmental justice and gain insight as to how best to address the issue through enlightened leadership in our communities, government agencies, state bar associations, law offices and legal services providers, law school clinics and academic institutions, and corporations.

"Professor Hill's 4th edition is remarkable. The professor-cum-artist has provided his students with a veritable easel by which they will be enabled to paint a picture illustrating the environmental issues confronting us as a community, nation, and globe. I can envision Professor Hill's students using his treatise, his easel, to not only depict the problems but to advocate for meaningful solutions. If America is to be, truly, great, there is a critical subset of factors of environmental justice concerns that must be remedied. Professor Hill's treatise illustrates that environmental justice is the primary issue confronting us all in the 21st century."

—Pierre B. Turner, Judge, New York City Housing Court (ret.)



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The Prospect for Boring Times Is Becoming Increasingly Attractive

During the campaign trail, candidate Donald Trump famously said, “We will have so much winning if I get elected that you may get bored with winning.” If excessive winning were the touchstone for boredom, the Justice Department attorneys defending Trump environmental policies would be enjoying fascinating lives these days. Too much winning has not been their problem.

Since taking office, the administration has suffered 22 losses in federal environmental court cases, excluding any losses defending Obama policies. That’s a remarkable number. The losses cut across several agencies, including the departments of Army, Commerce, Energy, Interior, State, and Transportation. But the biggest loser is EPA, which accounts for a whopping 15 losses.

Also telling is the nature of the losses. Most have resulted from Trump’s rush to try to delay or suspend implementation of currently applicable

environmental regulations adopted by prior administrations.

By the close of this summer, federal courts in eight cases have ruled that the Trump administration had acted unlawfully in seeking to delay and suspend an environmental rule that the federal agency had previously adopted. And in six additional cases, federal courts held that the administration had acted unlawfully by failing within a reasonable time to promulgate an environmental regulation or make a decision mandated by an environmental statute.

What makes this lopsided record so striking is that the federal government historically wins the vast majority of its cases. That is why when I first arrived at the Justice Department’s environment division decades ago, it took me months to appreciate that the federal

rules of appellate procedure required the “appellant” brief to be filed with a blue cover and the “appellee” brief to be filed with a red cover. Because the government almost never loses in federal district court, I had only seen red briefs. Only after months there when I noticed an anomalous blue-covered brief in a pile and asked why the color was different, did I learn the reason. It was the rare instance when the government had lost and had to file an appellant’s brief.

There are also reasons for why the government normally tends to win most of its cases. The first is that the career Justice Department lawyers and their career counterparts in the client agencies are excellent attorneys. They are careful, rigorous, and expert at knowing how to pitch even the most

challenging legal arguments in the best possible way, which includes knowing precisely how much, and not more, to ask of a court and what not to ask.

The second reason is that the federal government enjoys a lot of favorable presumptions in federal litigation. There are presumptions of regularity and reasonableness. Judges are generally inclined to find as credible government attorney assertions about federal practices or the urgency of certain public policy concerns. Those opposing the federal government face a major hurdle in overcoming the government attorney’s formal courtroom assertions “on behalf of the United States.”

But, of course, that is precisely what makes all the more telling such a high number of litigation losses. The lessons are several and portentous for the Trump administration — for its environmental policies, but with implications beyond environmental law.

The first is that a presidential administration that ignores the advice



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and expertise of career government personnel, including lawyers, does so at its peril. That is true for career government employees at Justice and no less true for those in their client agencies. You cannot succeed without their assistance to effectuate meaningful change.

But that is reportedly what Trump has sought to do, particularly in the environmental agencies and especially at EPA. The administration has repeatedly made significant decisions without seeking or ignoring the advice of expert career attorneys, economists, and scientists. Whatever one thinks of the Supreme Court’s opinion last June in the “travel ban” case, the president was clearly able to claim victory only because career government personnel had the opportunity to address the enormous legal infirmities in Trump’s first two executive orders.

The second lesson, however, has even longer term implications. The current administration risks squandering the federal government’s essential credibility in the federal courts. So long as the administration’s actions in the near term warrant such judicial disrespect, that is as it must be. But the concern is that the lack of deference will, once established, persist in the future when that is no longer so and proper deference is needed for effective government.

The Trump presidency has certainly not been boring. But with its penchant for generating ceaseless breaking news, the prospect of boring times is increasingly attractive.

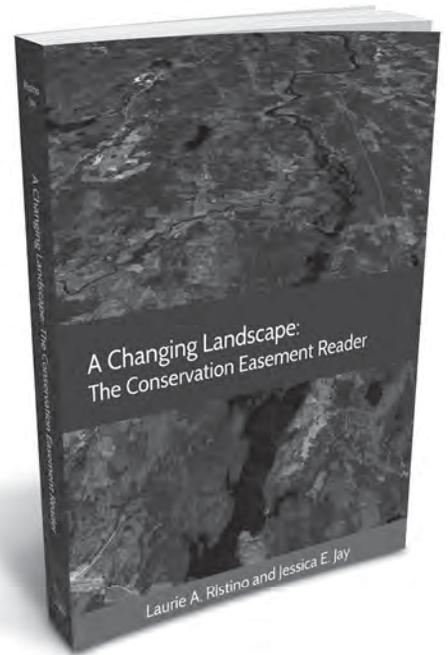
Overcoming the formal courtroom assertions “on behalf of the United States.”

A Changing Landscape: The Conservation Easement Reader

By Laurie A. Ristino and Jessica E. Jay

Conservation easements are an essential tool for protecting the American landscape. Between 2000 and 2010, the number of acres protected by land trusts grew from 23 million acres to 47 million acres. Conservation easements used by federal, state, and local governments would likely add several million additional acres to this total. Given their widespread use, ongoing innovations, and pressing environmental challenges, the time is ripe to provide a comprehensive review of conservation easements. *A Changing Landscape: The Conservation Easement Reader* does just that, offering conservationists, academics, government officials, and others a nuanced, multifaceted resource.

Featuring excerpts of leading articles and reports in law and in the natural and social sciences, *The Conservation Reader* illuminates various aspects of conservation easements. The book opens with background concepts in real property law, a history of the legal development and use of conservation easements, and examples of how these tools are used to achieve various environmental, conservation, and business goals. *The Conservation Reader* also examines the limitations and critiques of conservation easements, their tax treatment, and how they can be used in strategic resources planning and protection. The book closes with a forward-looking discussion of the evolving use of conservation easements in other countries, touching upon the promise and challenge of adapting this instrument internationally. Throughout, *The Conservation Reader* arms readers with the information they need in determining when and how the use of conservation easements is appropriate to achieve their strategic conservation goals.



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Some Reflections on the Role of Economics in Environmental Policy

In this column, I wish to reflect on three lessons I have learned: economic research can be used as a light bulb or a rock; it is important to move quickly when windows of opportunity open in the policy world to implement research ideas; and politics matter, and should not be ignored.

First, economic evidence can be used either as a *light bulb*, to illuminate an issue and possibly persuade policymakers of the wisdom of a particular course of action, or as a *rock*, as ammunition to support a policymaker's predisposed position. Paul Krugman wrote a column in the *New York Times* putting forward a less charitable metaphor, where he characterized some politicians as using economists "the way a drunkard uses a lamppost: for support, not illumination."

I once engaged in a roundtable with former chairs of the U.S. Council of Economic Advisers. A repeated theme from this set of economists was that they typically had more influence by working to stop bad ideas than by promoting good ideas.

Second, there is the importance of moving quickly when *windows of opportunity* open in the policy world to implement ideas that come from economic research. An example is work I carried out in the late 1980s under the sponsorship of the late Republican Senator John Heinz and former Democratic Senator Timothy Wirth in the form of a report, "Project 88: Harnessing Market Forces to Protect the Environment."

One of the proposals was to address the problem of acid rain with what is now called a cap-and-trade system. This idea resonated with the incoming administration of President George H. W. Bush, particularly with Counsel to the President Boyden

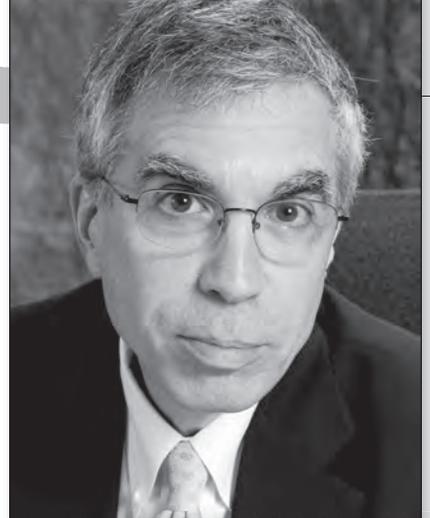
Gray. This led to numerous White House and other Washington meetings, which eventually contributed to the Bush administration's proposal of the Clean Air Act Amendments of 1990, including its path-breaking sulfur dioxide allowance-trading program.

Another example comes from the United Nations climate negotiations in Durban, South Africa, in 2011, where the delegates mandated a new approach in which all countries, not just the richest nations, would participate in addressing the need for greenhouse gas emissions reductions. The key challenge for climate negotiators

was how to meet this new mandate while still observing the fundamental principle of "common but differentiated responsibilities," which had previously been interpreted to mean that rich countries alone would shoulder the burden of reducing emissions.

Negotiators around the world were suddenly open to outside-the-box thinking. Over the following months and years we at the Harvard Project on Climate Agreements worked to help key negotiating countries develop a new policy architecture that could meet the challenge. The result was a hybrid approach that combined elements of top-down architecture with a healthy dose of bottom-up "pledge and review," which led eventually to the Paris Agreement of 2015.

The third lesson is that politics matter, and should not be ignored. For the Intergovernmental Panel on Climate Change's Fifth Assessment Report, I served as coordinating lead author of the chapter on "International Cooperation: Agreements and Instruments." I was surprised to find that the process was highly politicized. In particular, I was naive about



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There are three lessons it has taken me 30 years to learn

the final step, when 195 national governments approve the IPCC's "Summary for Policy Makers" line by line. The controversy associated with our chapter on international climate agreements resulted in that entire part of the summary being eviscerated of all meaningful substance at the government approval sessions for Working Group III in Berlin in 2014. I was disappointed and dismayed by the process and its outcome.

Fortunately, I learned from that experience, and just six months later I took a different approach, when I was in Copenhagen for the final stage of the entire five-year enterprise, namely the government approval sessions for the "Synthesis Report," which summarizes and combines the key findings from all three Working Group reports.

Rather than disdaining the politics of the occasion, I embraced it and spent the week in Copenhagen in careful negotiations with the key national governments, the result of which was that all of the essential text on international cooperation and agreements was preserved in the synthesis. Ironically, by recognizing, accepting, and participating in the fundamentally political aspects of the IPCC government approval process, I was able to keep the report of research from itself being politicized.

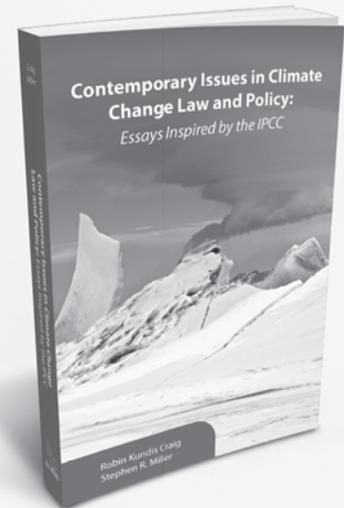
So, those are three lessons it's taken me three decades to learn. No doubt there will be many more lessons in the years to come.

Contemporary Issues in Climate Change Law and Policy: *Essays Inspired by the IPCC*

By Robin Kundis Craig and Stephen R. Miller

The Intergovernmental Panel on Climate Change's most recent set of reports, generally referred to collectively as the Fifth Assessment Report, present significant data and findings about climate change. But what role does law play in addressing and responding to these findings? This book, the second by the Environmental Law Collaborative, an affiliation of environmental law professors, focuses on the relationship between law and the Fifth Assessment Report in hopes of bridging this gap.

This book's chapters are illustrative of the overwhelming number of legal issues that climate change creates. Some of the contributions remain directly tied to the text of the IPCC's reports, while others focus on climate change more generally. Together, this volume contributes to a constructive and helpful discussion about how to address the climate change challenge.



Review

"The Environmental Law Collaborative has once again produced a volume of contributions on a theme of vital importance. Contemporary Issues in Climate Change Law and Policy uses the IPCC's latest round of reports as the lens through which to assess the progress and trajectory of law for climate change mitigation and adaptation. The result is a collection of chapters that are remarkably diverse in coverage yet coherent and intent in focus. Topics span the waterfront from national security and water infrastructure to religious perspectives and local community action. Each chapter stands on its own as thorough, insightful, and engaging, as well as a bountiful resource of law and policy update and analysis. Unified in the book through its core theme, the authors provide much to be gained for everyone from a newcomer to the rough and tumble of climate policy to those already steeped in its discourse."

—J.B. Ruhl

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The Origins of Political Polarization and the Fractured Climate Dialogue

Like a glass vase hitting the floor, our formerly cohesive and cooperative society is fracturing into diverse and sharply splintered parts. In the past, polarizing language seemed mostly to be confined to litigation and fringe groups. Now our political language and institutions, our financial, intellectual, and political elites, and the public all seem to be at odds.

The data bear this out. In its 2017 report “The partisan divide on political values grows even wider,” the Pew Research Center shows that the political positions of Republicans and Democrats on a range of issues broadly overlapped in 1994, but that by 2017 those positions had split into two quite distinct and nearly dichotomous camps. Gary Jacobson’s unpublished manuscript dated September 2018, and the references therein, document the diverse guises this polarization takes, thereby showing it to be a robust feature of today’s politics.

So too for environmental opinion. Aaron McCright and Riley Dunlap, in a 2011 article, document increasing polarization of the public’s views on climate change from 2001 to 2010. This has built up over decades; ponder the near unanimous support for the environmental statutes enacted in the 1970s, the weakly bipartisan support for the 1990 Clean Air Act Amendments, and the often vacuous posturing of environmental debates in today’s Congress.

As a scientist, I am driven to do more than just get caught up in all this, by adopting and arguing for the views of one particular group or another. I am curious as to the causes and mechanisms behind this political polarization — the why and the how. Alas, here matters become murky.

Part of the answer lies in human

cognition and psychology. The brain quickly and subconsciously acts on emotions, and only slowly and consciously pursues rational thought. The proximate driver of polarization is often political messages that appeal not to reason, but emotion.

Part of the answer lies in sociology. There is a sociological element to environmental debate, action, and polarization — an entire audience applauds an advocate, or a group protests in a sit-in. Our individual words, ideas, and actions reverberate off those physically close to us, who then echo them back to us. Often, we humans act by mimicking a reflection of ourselves. For a marvelously instructive anecdote, see Dan Kahan’s 2012 *Nature* article describing climate change opinion in a barber shop.

Humans strive to conform. And not just to those with physical proximity. We draw our opinions and positions from those we are close to, in words, intellect, and ideology.

Justin Farrell offers a fun glimpse into all this in his 2016 PNAS paper “Corporate funding and ideological polarization about climate change.” Therein he analyzes an immense data set of “contrarian” climate change texts containing some 39 million words, drawn from some 164 organizations (think tanks, grassroots organizations, etc.), involving over 4,000 individuals. At its core, the question he asks is: What words cluster together?

Using powerful computer language processing of these texts, Farrell identifies clusters of words often found together, and then shows that there are clusters of clusters, etc. Indeed, Farrell finds only four main clusters of clusters of clusters, which he roughly labels disputes over scientific evidence; public knowledge of climate change



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and Al Gore; state versus federal issues; and energy-company concerns. Farrell provides color commentary by labeling the clusters, yet those agglomerations are present naturally in the texts, not something Farrell arbitrarily imposed.

Farrell analyzed only contrarian texts. One could undertake a similar study for environmental nonprofits, or an even larger study of the entire immense data set of all climate change texts. I do not see this polarization as being the “fault” of climate deniers, climate advocates, or anyone else. It just is.

Farrell, and indeed the scientific literature generally, leave unanswered the question of what is driving this ever-increasing polarization. My hypothesis is that the over 7 billion humans on Earth are encountering real resource limitations and scarcity. There is increasingly not enough to go around, causing the breakdown of institutional structures that promote cooperation.

I fear that this political polarization is evidence we have transitioned to a world where our institutions are not strong enough to promote cooperation, and where each person and his or her close friends are just grabbing whatever resources they can, by whatever means. There are some instructive parallels in the downfall of the Roman Empire — first the barbarians trying to just grab some resources, and then the entire system eventually descending into the extreme political splintering of feudalism.

Are our institutions strong enough to deal with the scientific evidence?

Naturalness and Biodiversity

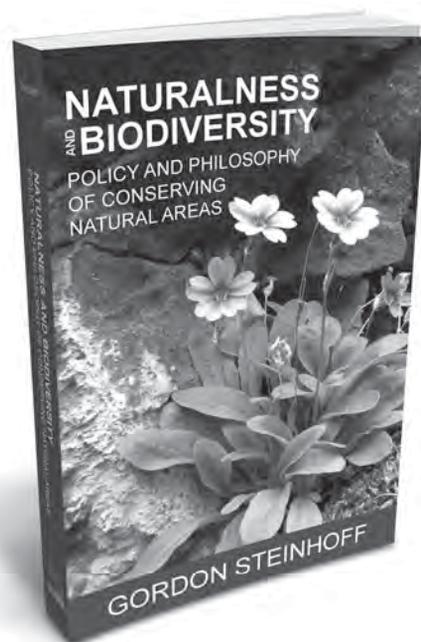
Policy and Philosophy of Conserving Natural Areas

By Gordon Steinhoff

Maintaining natural conditions and processes, or “naturalness,” is an essential goal in the management of wilderness, national parks, and other protected areas. Yet management experts routinely recommend the abandonment of naturalness as a required goal in protected areas. There are many examples of native biodiversity being lost or threatened as a result of managers manipulating protected areas to conserve “what we value” without respect for natural conditions. Too often, agencies seemingly ignore environmental goals expressed within federal law and policy in their efforts to satisfy consumer preferences, resulting in environmental degradation.

Naturalness and Biodiversity: Policy and Philosophy of Conserving Natural Areas is primarily concerned with the preservation of national parks, wilderness, and other legally protected areas through proper interpretation and application of federal environmental law and policy. Philosophers, legal scholars, and land use managers alike will appreciate the interdisciplinary approach Prof. Gordon Steinhoff takes with his discussion of philosophy, ecology, and environmental policy.

Although *Naturalness and Biodiversity* may be controversial, calling into question much that has been written by philosophers and by leading land management and restoration experts, it offers a needed response to much that appears in the current environmental literature, providing thoughtful analysis on why naturalness is essential for the preservation of native biodiversity.



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The Opportunities and Challenges for States' Clean Energy Policies

In prior columns, I have discussed efforts by the Federal Energy Regulatory Commission and some states to reconcile the operation of competitive wholesale power markets with state policies that preference the use of clean generation technologies. The latest chapter in this saga involves PJM, the regional grid operator for 13 eastern states and the District of Columbia.

Stakeholders in PJM have been debating the impact of state policies on the wholesale power market for several years. Over the last decade, the majority of states in PJM have implemented some form of *renewable portfolio standards* or *renewable energy credits* under which wind, solar, and other preferred resources receive payments for desired attributes. More recently, two PJM states have enacted *zero emission credit* programs under which qualifying nuclear plants receive similar payments when they generate emissions-free power.

The debate over the impact of these RPS, REC, and ZEC programs on PJM's power markets came to a head in June, when FERC concluded that state support for preferred types of generation is undermining the competitiveness of PJM's auction-based capacity market. Capacity is the commitment to be available to PJM when called upon in the future, and most generators in the PJM footprint are required to offer their capacity to PJM in annual auctions.

Fossil-fuel generators have complained that payments to non-emitting resources under state clean energy programs give those resources an unfair advantage over emitting generation when offering capacity to PJM. FERC agreed, concluding that payments under state programs represent an "untenable threat" to the competitive integrity of PJM's market.

To address this threat, FERC is seeking comment on a series of reforms to the PJM market that could fundamentally reshape wholesale power markets — and opportunities for clean generation — across the PJM region. The mechanics of FERC's proposal are technical and complicated, but in a nutshell, FERC is proposing that states with clean energy goals would opt-out of PJM's capacity market for a portion of their electricity demand. For that portion, they would purchase capacity directly from preferred resources, and buy capacity for the remainder of their demand through the PJM auction, effectively bifurcating capacity procurement between PJM and the states.

If states do not take advantage of this bifurcated structure, FERC's June order says that resources receiving state support must have their offer prices in the capacity auction reset (i.e., increased) by PJM to remove the economic benefit of the state payment. FERC concluded that

this action was necessary to ensure the competitive integrity of capacity prices in the auction. However, it will likely increase electricity prices for consumers throughout the PJM footprint with no benefit to clean energy; in fact, the opposite is possible, as the additional capacity market revenue will go to emitting resources. Customers therefore will end up paying twice for capacity: first through state programs procuring clean energy, and second through PJM's purchase of capacity to replace the state-supported resources.

FERC's bifurcated capacity market proposal creates new opportunities — but also challenges — for states desiring to support clean generation. Reducing the amount of capacity procured in the PJM auction by the amount of state-incentivized clean capacity through the opt-out will make it possible for states



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to cost-effectively meet and expand their energy policy targets without fear of PJM "replacing" renewable and nuclear energy supported by the states with emitting generation purchased through the capacity auction. Moreover, states will have greater flexibility to create portfolios of clean energy that meet state policy objectives while also satisfying the performance obligations of capacity resources in PJM.

However, FERC has established an aggressive schedule for implementing this new framework. State procurement mechanisms must be in place prior to the next capacity auction, normally held in May of each year although PJM obtained FERC approval to hold its next auction in August 2019. State legislators and utility regulators have months, not years, to develop or modify procurement mechanisms to conform to the opt-out mechanism being developed by FERC.

Complicating matters further, FERC's opt-out proposal is just that — a proposal that is subject to a comment period that runs through November. States, the environmental community, and other stakeholders should make their voices heard. PJM's capacity procurement rules will have a lasting impact on the ability of states to cost-effectively achieve carbon reduction and other environmental goals. Working together, we can ensure that states retain the authority and flexibility they need to achieve those goals.

The author is grateful for the assistance of Kathy Robertson in developing this column.

The debate over the programs' impacts on power markets came to a head in June

Paying for Tomorrow

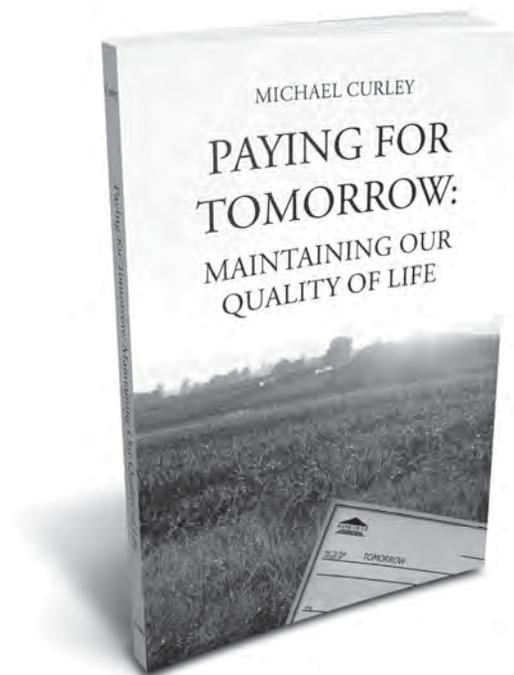
Maintaining Our Quality of Life

By Michael Curley

Our quality of life is heavily influenced by the quality of our environment. Whether we want to keep the beauty and quality that we have, or we want to change and clean up those areas of our environment that have been compromised, environmental quality is inextricably bound up with our sense of the quality of our lives. Yet, this comes with a cost.

We were relatively successful at tackling many of the environmental problems of the past. But we now face a new set of environmental challenges, and we have neither the financial nor the operational structures to deal with these situations. And so it is imperative that we adopt the most cost-effective solutions to the problems we face now and in the future.

Written for a general audience, *Paying for Tomorrow: Maintaining Our Quality of Life* explores and explains the various financial strategies that could be used to preserve the quality of our lives. Yes, we have to pay to reduce greenhouse gases, but we also have to pay for climate resilience, adaptation, and mitigation. Yes, we have to have safe drinking water plants and wastewater treatment plants, but we also need power to run them. Yes, we want to conserve energy and increase our use of renewables, but we also need to protect jobs. This book is about what we are going to have to pay for in order to maintain our quality of life in the foreseeable future. And it is about the strategies we must employ to make sure that we use the most cost-effective and least expensive strategies to pay for them.



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Peak Behind the Curtain of Act Two of the Trump Environmental Policy

As the curtain closes on Act One of the Trump administration, environmental law practitioners are looking ahead to Act Two. Intensive litigation over the first two years have produced a series of precedent-setting administrative law rulings testing the ability of the Executive Branch to delay, rescind, and reverse prior environmental policies. The next two years will involve a pivot from process to substance.

For those keeping score, the summer season did not end well for EPA. The Ninth Circuit, for example, struck down a rule that would have allowed continued residues of the pesticide chlorpyrifos on food, ordering the agency to revoke tolerances and cancel registrations. That case was soon followed by a D.C. Circuit decision in-

validating portions of EPA's regulation governing disposal of coal ash residue by power plants. The court, having rejected the agency's last-minute request to hold the

case in abeyance pending reconsideration, denied industry's petitions, granted those of environmentalists in part, and remanded to the agency, which is now tasked with crafting new limits stringent enough to satisfy the court.

The end of summer also produced a series of setbacks for agencies attempting to call time out on Obama-era regulations while they grappled with whether and how to reconsider those rules. In one dramatic development, a district court in South Carolina set aside Trump's attempt to suspend for two years the Obama-era regulation defining the geographic reach of *waters of the United States* under the Clean Water Act. The judge admonished that "different administrations may implement different regulatory priorities, but the [Administrative Procedure Act] requires that the pivot from one administration's

priorities to those of the next be accompanied with at least some fidelity to law and legal process."

This was only the latest chapter in the long-running saga surrounding the WOTUS rule, which had been issued in 2015 but enjoined from taking effect by the Sixth Circuit. That injunction was dissolved when the Supreme Court decided earlier this year that challenges to the rule had to be filed first in district court. The Army Corps of Engineers and EPA then acted promptly to suspend WOTUS so that it would not become enforceable while the agencies labored over a replacement rule that would feature a narrower interpretation inspired by Justice Antonin Scalia's plurality opinion in *Rapanos*.

Judge David Norton held that the agencies violated the APA by bypassing notice-and-comment requirements and failing to consider the substantive implications of the suspension. The story is far from over, as litigants seek to expand the

number of states in which WOTUS is enjoined pending judicial review, while appeals are pursued and environmental practitioners scramble to advise their clients on the cascade of developments.

In another important case on the power to delay, the D.C. Circuit set aside the Trump EPA's rule postponing by 20 months the Obama EPA's amendments bolstering the Risk Management Plan requirements under Section 112(r) of the Clean Air Act, which regulates safety at chemical plants and similar facilities. The amendments, developed in response to high-profile accidents like the one in 2013 at a West Texas fertilizer plant, were due to take effect in 2017. The Trump administration issued a series of delay orders, culminating in a regulation to push back the effective dates while the agency reconsiders.

The next two years will feature marquee cases finally judging Trump policies on their merits



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The court set aside the delay rule as arbitrary and capricious, adding teeth to the requirement that agencies provide a reasoned explanation for changes in position, and commenting that the rule was calculated not to ensure compliance but to enable non-compliance. At oral argument, Judge Brett Kavanaugh had expressed some sympathy with the administration's prerogative to reconsider prior policies, but he recused himself before the case was decided, after being nominated to the Supreme Court. The two-judge panel remarked that EPA had made a "mockery" of the statute. Once again, practitioners have their hands full advising clients in a constantly shifting landscape.

Does this recent series of setbacks spell trouble for Act Two? Not necessarily. Act One has largely been about process. True, the skirmishing over an agency's power to delay, rescind, and reconsider has long-reaching implications. Indeed, today's litigants may live to regret some of these precedents, which could tie the hands of future administrations. But the current one is now busy finalizing a number of big-ticket items — moving beyond just repealing to replacing Obama-era regulations, such as WOTUS, the Clean Power Plan, and vehicle fuel-efficiency standards. As the substance of these programs is challenged in litigation, the next two years will likely feature a series of marquee cases in which these new policies are finally judged on their merits. There won't be an empty seat in the house.

The First Earthrise Launched an Era

Exactly 69 hours, 8 minutes, and 16 seconds after launch, the crew of Apollo 8 burned the spacecraft's retro rockets while behind the far side of the Moon and out of contact with the Earth. That daring maneuver caused the capsule to enter lunar orbit. The craft circled the Moon three times. After the fourth pass behind the satellite, the three astronauts looked through their tiny glass port and became the first humans to witness an Earthrise.

Lunar Module Pilot William Anders took some photographs of the view in black and white, but he immediately realized the import of what he was seeing and called excitedly for a camera with color film. Command Module Pilot James Lovell passed him the Hasselblad and Anders took one of the most important photographs since the invention of the medium. It was Christmas Eve 1968.

That night 50 years ago, during a television broadcast that was at the time the most viewed in history, Com-



mander Frank Borman announced that the crew had a message for the human race. Then each astronaut read in turn from the Creation Story in the Book of Genesis.

There was a poignancy that can't be described to today's interconnected world in hearing that scratchy transmission from a quarter of a million miles away, and the coincidence of the holy date and the tale of a universe coming into existence from nothingness to realize the awe of the harmoniously circling spheres created the perfect message for the first time that humanity had left its home planet.

Then when Apollo 8 returned to Earth and the film was developed, the import of the Earthrise image became apparent, leveraging on the broadcast of the opening verses of the Old Testament. It is safe to say that photograph helped to kick off the environmental era. One year after the lunar mission, Congress passed the National Environmental Policy Act. That same day, December 22, 1969, the Environmental Law Institute opened its doors.

Capturing the movement created by that photo, the essayist and medical doctor Lewis Thomas wrote about

“Illinois Attorney General Lisa Madigan announced a lawsuit . . . against Trump International Hotel & Tower in Chicago, alleging it has violated environmental laws by dumping millions of gallons of water in the Chicago River daily without first conducting studies on the impact to the river’s fish, as federally mandated.”

— Politico Morning Energy

the view in the concluding chapter of his 1974 best seller *The Lives of a Cell*. The image makes sense of Thomas's whole book. *Lives* makes the case that cells are collections of matter that work to perpetuate themselves — absorbing, storing, and using energy — and to produce new generations. Only from the vantage of another celestial body, however, is it apparent that the Earth too is self-perpetuating.

“Viewed from the distance of the Moon, the astonishing thing about the Earth, catching the breath, is that it is alive. The photographs show the dry, pounded surface of the Moon in the

Gender-balanced Boards Save Dollars in Environmental Penalties

Companies with a more balanced mix of men and women on their boards are better at protecting the environment and less likely to be sued for environmental law violations, according to new research from the University of Adelaide.

The study, published in the *Journal of Corporate Finance*, examined 1893 environmental lawsuits raised against the

‘Standard and Poor’s’ 1500 firms in the United States between 2000 and 2015 and identified direct links between gender diversity and corporate environmental violations.

The study found companies with greater gender diversity on their boards experienced significantly fewer environmental lawsuits, indicating that female

directors contribute to reducing corporate environmental litigation. For example, for every female added to a board of directors in the sample, the average lawsuit exposure is reduced by 1.5%, which on an average environmental lawsuit (USD \$204 million) could equate to a saving of USD \$3.1 million.

The study's author and Adelaide Business

School Senior Lecturer, Dr Chelsea Liu says the explanation for the findings lies in gender socialisation and diversity theories. “Gender diversity is what’s important — female representation on boards is most important where the CEO is male, and less important if the CEO is female,” says Dr Liu.

— AAAS Eureka Alert

foreground, dead as an old bone. Aloft, floating free beneath the moist, gleaming membrane of bright blue sky is the rising Earth, the only exuberant thing in this part of the cosmos.”

Thomas notes that “it takes a membrane to make sense out of disorder in biology.” Just as a cell is protected by its membrane, “When the Earth came alive it began constructing its own membrane, for the general purpose of editing the sun.”

It happened in slow stages, as the rocky planet outgassed an atmosphere that proved hospitable for the first photosynthetic cells, which populated the surface with a veneer of green — the first biosphere. These cells produced an oxygen atmosphere with just enough carbon dioxide to cause a congenial greenhouse effect and serve as food for the plants that would later evolve.

In the upper reaches of the membrane, the oxygen is converted by sunlight into ozone, which in turn acts to shield the biosphere producing the oxygen from damaging ultraviolet radiation. Thus, the membrane edits energy to the benefit of the higher life forms that became possible, including of course the first animals and, eventually, environmental professionals.

“We are safe, well-ventilated, and incubated provided we can avoid technologies that might fiddle with that ozone, or shift the levels of carbon dioxide,” Thomas concludes. Chlorofluorocarbons were just becoming known to damage the ozone layer, leading to a phaseout in the 1987 Montreal Protocol. And the theory of climate change as the result of increased greenhouse gases was just getting launched, but within two decades the world had agreed to the 1992 UN climate convention and made more concrete steps in 1997 in Kyoto and 2015 in Paris.

When humanity realized how precious life is on our lonely blue-and-green rock, the reaction kicked off an era of legal interventions to protect the membrane we call the environment. A half century on, we’re still at it.

NOTICE & COMMENT is written by the editor and represents his views.

DID CONGRESS ADDRESS CLIMATE CHANGE?

Whether the Clean Air Act, originally passed in 1970, can be applied to global warming was a matter of intense debate during the litigation leading up to the Supreme Court’s 2007 decision *Massachusetts v. EPA*, in which the justices ruled that if the agency determines greenhouse gases are dangerous, it is required to regulate them. Two years later, the Obama EPA issued an endangerment finding for carbon dioxide and other gases, which was followed by restrictions on emissions from mobile sources and, later, power plants.

Buried in the original 1970 legislation is the word *climate*, in a list of welfare conditions that concerned the lawmakers in writing the powerful statute. Climate change didn’t become a major issue till the 1980s and wasn’t determined to be a matter in the act’s ambit for another two decades after that. Could it be that the original drafters of the statute knew about an issue that wouldn’t become a public policy concern for more than a generation?

Tom Jorling served as minority counsel to the Senate Committee on Public Works and its Subcommittee on Air and Water Pollution from 1968 through 1972. We asked him about this single word in the original legislation:

“The several years preceding the enactment of the 1970 act witnessed a rapid expansion of knowledge about the effects of air pollution. While much attention was given to the health effects in the committee, in Congress, in the media, and among interest groups there was growing awareness of broad-scale physical and chemical changes in the atmosphere as well as ecosystem effects as a result of air pollution. This was explicitly recognized in the act by including in its regulatory provisions, not just controlling health effects, but also abating effects on ‘welfare,’ defined to include ‘effects on soils, water, crops, vegetation, man-made materials animals, wildlife,

weather, visibility, climate . . . and personal comfort and well-being.’

“There was growing recognition that human activities involving the release of pollutants into the atmosphere was causing significant consequences for the biosphere. Some of the consequences brought early to the attention of the committee resulted from the documented fact that radionuclides from above-ground nuclear weapons testing were distributed through the atmosphere. Similarly, the DDT molecule was found in the tissue of every organism sampled throughout the Earth’s biosphere. There was increasing concern over the effects on precipitation patterns produced by the release of particulate matter, primarily from the combustion of fossil fuels.

“There was growing concern over the apparent increase in heating of the atmosphere, not just in the urban heat pockets that had been so well documented. Senators Edmund Muskie and John Sherman Cooper, primary authors of the 1970 act, attended, along with some committee staff, the 1968 Congressional Joint Colloquium on the Environment, where the atmospheric scientist Walter Orr Roberts described the warming consequences of packing the atmosphere with gases resulting from combustion of fossil fuels.

“The scientists demonstrated the adverse effects of atmospheric ozone, photochemically produced from air pollutants, on vegetation and crops. They expressed concern about the deposition downwind of industrial facilities of nitrogen, sulfur, and other compounds shown to cause landscape-scale ecosystem degradation.

“In short, there was widespread recognition that air pollutants, some known and others that would be revealed with more research, caused what the act called ‘welfare’ effects that were addressed by Congress in the regulatory structure of the 1970 act.”

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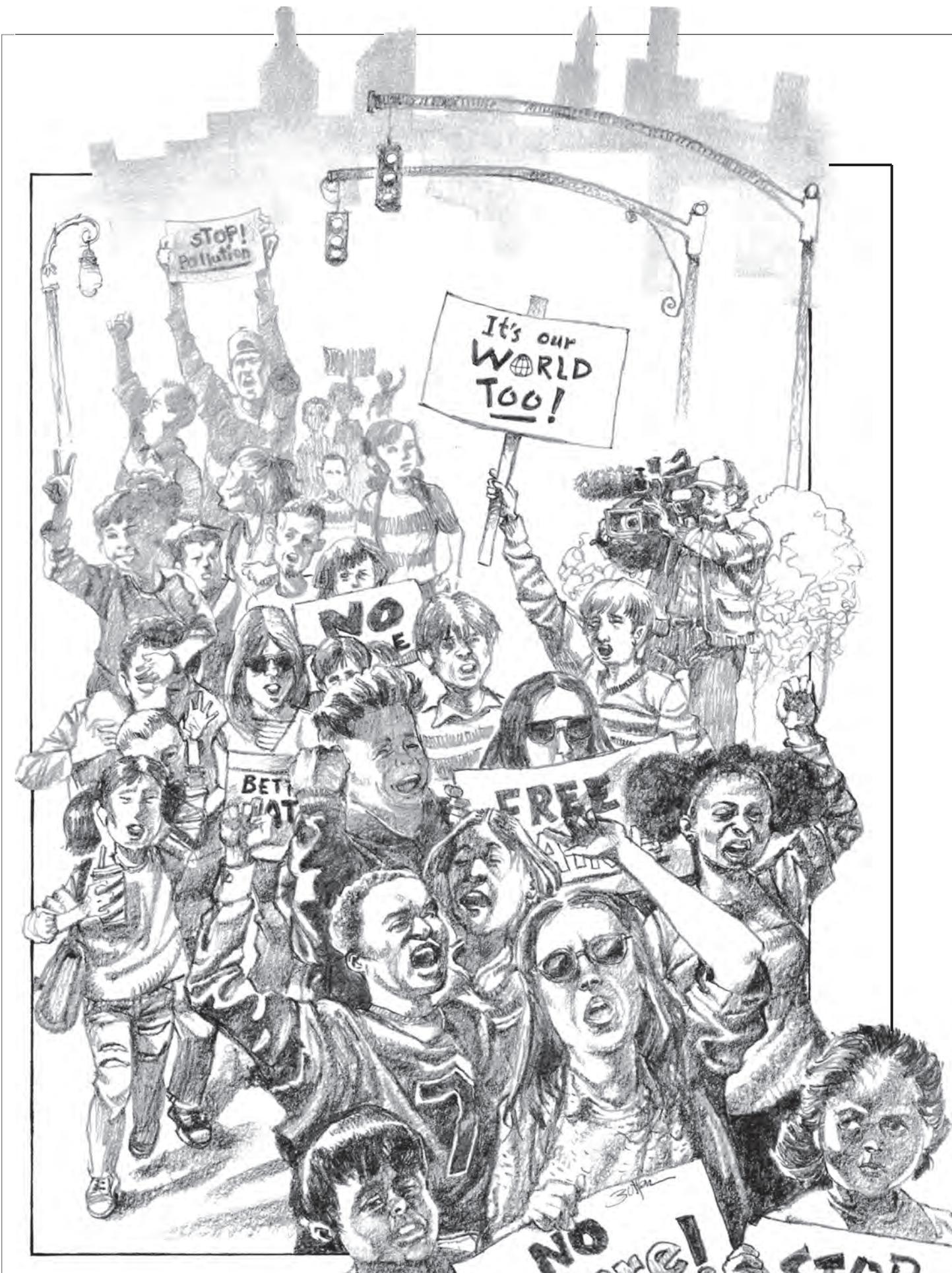
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“No Ordinary Lawsuit”

Youth plaintiffs in Oregon are suing the federal government for climate inaction — one of many similar suits around the country and the world. Litigation based on the public trust doctrine can be difficult to win, but Millennials are speaking out about an issue that profoundly affects them



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Before rap, before hip-hop, there was the music of Gil Scott-Heron, the poet, singer, songwriter, musician, and author of the 1971 spoken-word anthem “The Revolution Will Not Be Televised.” Political consciousness was at the foundation of his work. According to Scott-Heron, “The revolution takes place in your mind. . . . When you want to make things better you’re a revolutionary.” Today, of course, the revolution is not only televised, it is Facebooked, Twittered, and Instagrammed. The kids who survived the horrible school shooting in Parkland, Florida, became successful young revolutionaries in the fight for stronger gun laws via social media and 24-hour news channels.

But in a quiet federal district courtroom in Oregon, another group of kids are becoming revolutionaries, too, but via legal briefs rather than tweets and mass rallies and talking heads on cable and YouTube. The Supreme Court itself, in denying the Trump administration’s application for a stay, unanimously said last summer it will not interfere with the progress of the youngsters’ lawsuit against the federal government for failing to protect them against a worsening environment caused by emissions of greenhouse gases. To be clear, this suit was not a reaction to the Trump administration; it was filed in August 2015, when Trump was still a long-shot candidate. But it has been injected with renewed fervor by the president’s withdrawal from the Paris climate agreement and his anti-climate regulatory rollbacks.

Millennials — the grandchildren of Baby Boomers like Scott-Heron — are speaking out and demanding

comprehensive reform of government policy regarding climate change. They have more at stake than their aged progenitors in ensuring that the habitability of the planet doesn’t erode in their lifetimes. Their youthful energy and enthusiasm, and demand for change, is evident broadly in the environmental law and policy area, and specifically in litigation in federal and state courts.

These Generation Y activists believe in the pluralism of a diverse country and in environmental justice. They affirm the basic principle that all people, regardless of age, race, color, national origin, or socioeconomic status, are entitled to fair treatment and meaningful involvement with respect to the development, implementation, and enforcement of climate change policy. Finally, these revolutionary persons believe the federal government is required to protect the environment and the atmosphere in particular as part of its public trust responsibilities. Otherwise, in denying them life, liberty, and the pursuit of happiness, the federal government is violating these due process rights under the Constitution.

Sadly, EPA’s new policy is to deny that greenhouse gas emissions are driving climate change. This abnegation, however, is entirely inconsistent with the law. Notably, the agency’s current position is contrary to that established by then Administrator Lisa Jackson in response to *Massachusetts v. EPA*, in which the Supreme Court ruled in 2007 that the agency must regulate pollutants that cause climate change. Consequently, in the 2009 Final Endangerment Finding under Section 202(a) of the Clean Air Act, Jackson determined that

greenhouse gases released into the atmosphere threaten public health and the welfare of future generations. The Trump administration's change in policy and pullout from the Paris Agreement is contrary to the dictates of the *Massachusetts* decision and to the findings of the U.S. Global Change Research Program, the National Academy of Sciences, and the Intergovernmental Panel on Climate Change that the warming of the climate system in recent decades is unequivocal.

Fortunately, a diverse group of 21 young people, between the ages of 8 and 19, from across the country are challenging in federal district court in Oregon the Trump administration's strained views on climate change and climate science in a landmark lawsuit, *Juliana v. United States*. The youngsters complain that the federal government, in causing climate change, has violated the newest generation's constitutional rights to life, liberty, and property in violation of the Due Process Clause of the Fifth Amendment. The complaint alleges that the federal government promotes the development and use of heat-trapping fossil fuels. The climate youth plaintiffs argue that the government has known for decades that fossil-fuel emissions are destroying the climate system and not only failed to restrict those emissions but also continued to authorize fossil-fuel-development projects that amplify the danger and foreclose the opportunity to stabilize the atmosphere. The climate youth plaintiffs seek a court order requiring the president to implement immediately a national plan to decrease atmospheric concentrations of carbon dioxide to a safe level, 350 parts per million by the year 2100, which is based upon sound climate science.

In denying them their constitutional rights, the youths argue that the federal government has failed to protect and conserve the nation's public trust resources, including the atmosphere. This argument originates from the Atmospheric Trust Litigation Approach developed by Professor Mary Christina Wood of the University of Oregon's Environmental and Natural Resources Law Center. According to Wood, "It's kind of a straightforward exercise to apply the public trust to the atmosphere. The government is a trustee and has to protect it for the benefit of present and future generations."

In *Massachusetts v. EPA*, the Supreme Court recognized the federal government's public trust responsibility regarding the atmosphere. "When a state enters the union," the Court wrote, "it surrenders certain sover-

eign prerogatives. Massachusetts cannot invade Rhode Island to force reductions in greenhouse gas emissions, it cannot negotiate an emissions treaty with China or India, and in some circumstances the exercise of its police power to reduce in-state motor vehicle emissions might well be preempted. . . . These sovereign powers are now lodged in the federal government."

Understanding the climate youth plaintiffs' arguments in this case requires a brief primer on the ancient public trust doctrine, which has been in existence since the time of the Romans. In the Institutes of Justinian, the Emperor Justinian articulated the idea of the public trust when he stated, "By the law of nature these things are common to mankind — the air, running water, the sea, and consequently the shores of the sea." In its early form, the public trust doctrine sought to protect the public's right to access certain resources, particularly navigable bodies of water. The English later incorporated the doctrine into their legal system, and, in 1215, the public trust emerged as part of the Magna Carta, which, among other things, specifically condemned interference with citizens' access to navigable waters, and prevented the king from giving favored noblemen exclusive rights to hunt or fish in certain areas. Although the monarch was understood to own the land, he had an obligation to protect it for use by the public. Still later, the public trust doctrine became a part of American common law, particularly in state courts. And in 1983, in the seminal case *National Audubon Society v. Department of Water and Power of the City of Los Angeles*, the California Supreme Court ruled, "The public trust is an affirmation of the duty of the state to protect the people's common heritage of streams, lakes, marshlands and tidelands." Other state courts have made similar findings.

The American Petroleum Institute, the National Association of Manufacturers, the American Fuel & Petrochemical Association, and other organizations immediately intervened in the *Juliana* case as defendants, joining the U.S. government in trying to have the case dismissed. (They later filed motions to withdraw, which were granted by the court last year.)

In April 2016, U.S. Magistrate Judge Thomas Coffin decided in favor of the 21 climate youth plaintiffs. Coffin characterized the case as an "unprecedented lawsuit" addressing "government action and inaction" resulting "in carbon pollution of the atmosphere, climate destabilization, and ocean acidification." In ruling that the case should proceed, Coffin wrote: "The debate

In denying them their constitutional rights, the youths argue that the federal government has failed to protect and conserve the nation's public trust resources, including the atmosphere

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A Safe Environment is a Constitutional Right

In *Juliana v. United States*, one of those cases brought as part of the Atmospheric Trust Litigation, a group of 21 young people sued the federal government for failing to act to protect plaintiffs against risks the defendants “have known for more than fifty years.”

In the trial, which was set to begin in late October in the federal District Court for the District of Oregon, the plaintiffs will seek to show that government actions such as permitting of fossil fuel sources destabilize the global climate system and endanger lives, including the lives of the plaintiffs. Rather than suing for damages, plaintiffs seek a court order to require the federal government to use science-based regulation to combat climate change.

Arguing that the government has an affirmative duty to act, plaintiffs invoke the public trust doctrine and the constitutional rights to life, liberty, property, and a clean and healthful environment. They seek judicial redress in the face of legislative failure to protect these rights of people. They allege that “affirmative aggregate acts of defendants have been and are infringing on plaintiffs’ right to live [with a] stable climate system.”

Specifically, plaintiffs claim that government policies and actions undermine the capacity of people to “provide for their basic human needs” and to safely raise families, practice religious beliefs, maintain their bodily integrity, and “lead lives with access to clean air, water, shelter, and food.” In finding the lawsuit may proceed, the court stated: “Exercising my ‘reasoned judgment,’ I have no doubt that the right to a climate system capable of sustaining human life is fundamental to a free and ordered society.” This statement by the district court mirrors the Supreme Court’s test for fundamental, constitutional rights.

To obtain judicial relief, plaintiffs need to show that a fundamental constitutional right is at stake. Absent such a showing, conventional wisdom is that the political process would be plaintiffs’ only recourse. In assessing the question of fundamental rights (and, thus, the possibility of judicial redress) the District Court will examine our history, legal traditions, and practices. Using this analysis, the Supreme Court has recognized a range of fundamental — that is, inalienable — rights, including privacy rights and rights of personal autonomy such as the right to marry and have a family.

In *Obergefell v. Hodges*, the Supreme Court recognized the fundamental right of same-sex couples to marry inherent in liberty and arising “from the most basic human needs.” Courts apply this analysis to actual circumstances of present controversies. Indeed, because of the “case or controversy” requirement, constitutional rights are not stated except when a court finds the denial of the right. For example, no “right to marry” decision would have been recognized (or needed recognition) but for the state laws denying the right of same-sex couples to marry.

The founders of our country promised protection of specific rights against government oppression and, in the Ninth and Tenth Amendments, rejected a reductive reading that would limit the rights of the people and states to those named. The Founders relied on the touchstone of the public good as a foundation for personal freedom and political stability, and they set in place a system of separated powers in three co-equal branches of government to sustain the public good for future generations.

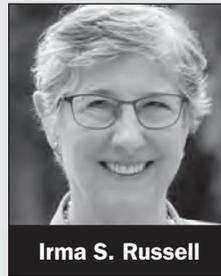
The preamble to the Constitution states its purpose of serving the public good: “To establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity.” It echoes the maxim *Salus populi suprema lex esto*, “The good of the people is the supreme law.”

Government action is often couched in terms of political choice rather than responsibility. Importantly, however, the legislature consistently recognizes the principle of serving the public good. In passing the Clean Air Act, for example, Congress pointed to “mounting dangers

to the public health and welfare” as the basis for its action.

While people look first to the legislature to provide protection against threats to the general welfare, taking the science of climate change seriously means

that the legislature is not the last place to look. All three branches of government are responsible for securing the fundamental rights of the people and serving the public good. The *Juliana* case requests regulation of greenhouse gases. Plaintiffs seek judicial imposition of positive requirements to protect the plaintiffs and others against the urgent threat of climate change. In so doing, they raise the question whether a right to a healthful environment — like the right to marry and other personal rights — is central to personal autonomy.



Irma S. Russell

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about climate change and its impact has been before various political bodies for some time now. Plaintiffs give this debate justiciability by asserting harms that befall or will befall them personally and to a greater extent than older segments of society. It may be that eventually the alleged harms, assuming the correctness of plaintiffs' analysis of the impacts of global climate change, will befall all of us. But the intractability of the debates before Congress and state legislatures and the alleged valuing of short term economic interest despite the cost to human life, necessitates a need for the courts to evaluate the constitutional parameters of the action or inaction taken by the government. This is especially true when such harms have an alleged disparate impact on a discrete class of society."

In November 2016, U.S. District Court Judge Ann Aiken upheld Coffin's recommendation with the issuance of a historic opinion and order denying the motions to dismiss. "This is no ordinary lawsuit," Aiken wrote. "This lawsuit is not about proving that climate change is happening or that human activity is driving it. For the purposes of this motion, those facts are undisputed. The questions before the court are whether defendants are responsible for some of the harm caused by climate change, whether plaintiffs may challenge defendants' climate change policy in court, and whether this court can direct defendants to change their policy without running afoul of the separation of powers doctrine."

With respect to the climate youth plaintiffs' public trust argument, Aiken determined that the atmosphere is in fact a public trust asset, that the federal government has a public trust obligation, that the federal government's public trust obligation is not displaced by federal environmental statutes, and that the youth plaintiffs have a private right-of-action to enforce the federal government's public trust obligation.

In February 2017, President Trump was named a defendant and the new administration immediately took aggressive action in the litigation. The administration filed a motion seeking expedited appeal of Aiken's opinion and order to the Ninth Circuit. And in June 2017, the administration filed a writ of mandamus petition with the Ninth Circuit seeking an extraordinarily rare review of Aiken's opinion and order.

Ten months later, a unanimous three-judge panel of the Ninth Circuit rejected the Trump administration's "drastic and extraordinary" petition for a writ of mandamus. The appellate court ruled that the case could

proceed toward trial, and that the administration had not satisfied the factors necessary for an extraordinary writ of mandamus. Chief Judge Sidney R. Thomas wrote that the federal government's request to halt the litigation was "entirely premature," and that "the government's concerns would be better addressed through the ordinary course of litigation."

The Trump administration, surprisingly, filed a second petition for a writ of mandamus to dismiss the case altogether, or, in the alternative, to stay all discovery and trial. Last year, in a per curiam decision, Thomas wrote: "No new circumstances justify the second petition to grant mandamus relief," and that "the merits of the case can be resolved by the district court or in a future appeal." The request for a dismissal was denied, and that action was affirmed by the Supreme Court last summer.

In short, the administration cannot evade a constitutional climate change trial, which is scheduled to be underway at the time you read this. In order to prevail, the youth plaintiffs will need to show that the federal government's actions created the danger to the plaintiffs; that the federal government knew its actions caused the danger; and that the federal government, with deliberate indifference, failed to act to prevent the alleged harm.

In the course of this litigation, the following questions arise: Do the actions of President Trump in withdrawing the United States from the Paris climate agreement, and in related policy actions such as reversing Obama's regulations addressing carbon pollution from automobiles and power plants, make the plaintiffs' case stronger? Are President Trump's past statements

that climate change is a "Chinese hoax" a boost to the plaintiffs? Will this case determine whether there is an enforceable human right to a clean and healthy environment for young people based upon the adverse effects of climate change? Will this case determine whether the Constitution guarantees a livable planet for young people? A jury of ordinary Oregon citizens will decide, among other things, the purpose of the public trust; the scope of the doctrine, particularly as it applies to the atmosphere; and the powers and duties of the federal government as trustee of the environment.

The climate youth plaintiffs are represented by the non-profit organization Our Children's Trust, whose "mission is to protect the Earth's atmosphere and natural systems for present and future generations."

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Judge Aiken determined that the atmosphere is in fact a public trust asset, that the federal government has a public trust obligation, and that the obligation is not displaced by federal environmental statutes

An Unlimited Expansion of the Public Trust

This case represents a contentious means of trying to address a contentious issue. Plaintiffs maintain that, by virtue of the Due Process Clause or the common law doctrine of the public trust, they have the right to prevent government activity that threatens a life-sustaining climate, and to demand government activity to maintain such a climate. The claims have somewhat tenuous roots in precedent. But their acceptance would represent a substantial step beyond case law. The result would be the creation of vast, unlimited duties for the federal government.

Consider the precedent-setting, and radical, nature of what the *Juliana* case asks of the federal judiciary. A handful of plaintiffs request that a district court judge make a climatological determination, and then use that finding to decide controversial issues of national policy and foreign relations. Although the court may try to temper plaintiffs' prayer, the nature of their claims may result in a remedy entailing judicial direction to Congress and the Executive Branch to legislate and to negotiate treaties. The threat to the separation of powers posed by such a remedy should give any reviewing court pause.

Although proponents of those claims paint them as logical outgrowths of existing doctrine, such a "domesticating" characterization is implausible. To be sure, incorporation of explicit textual protections in the Bill of Rights has progressed relatively continuously (if not rapidly) under the Due Process Clause. But federal courts have historically been reluctant to identify new unenumerated fundamental rights, like the climate right advanced in *Juliana*. And those unmentioned rights that have been recognized are alleged to be rooted in the protection of individual liberty and per-

sonal choices: the right to parent one's children, the right to marry a person of a different race or the same gender, and the right to privacy. A purported right to a life-sustaining climate does not track readily to this pattern. Instead, it takes the due process analysis one step broadly back to encompass interests that are necessary for life itself, regardless of political and social concerns.

Although a right to a life-sustaining climate might seem attractive as necessary to the exercise of all other rights, it unmoors substantive due process from the protection of the individual, and constitutionalizes almost every aspect of human survival — as for instance a governmental obligation to eradicate preventable diseases.

While some will argue that global warming is a unique threat, it's not difficult to imagine a lawsuit challenging the government's failure to prepare for imminent comet or asteroid bombardment, which "will cause human deaths, shorten human lifespans, result in widespread damage to property, threaten human food sources, and dramatically alter the planet's ecosystem."

The public trust argument advanced in the *Juliana* case fares no better. Historically, the doctrine in America was limited to the preservation of certain public uses of navigable waters: commerce, navigation, fishing, and bathing. The doctrine required governments to consider impacts to those uses before making public — or approving private — land-use decisions that might harm those uses.

In the early 1980s, environmental litigators successfully obtained the doctrine's expansion in many jurisdictions to cover new trust

uses, such as recreation and environmental protection. The expansion of the public trust doctrine to the atmosphere — apparently what the *Juliana* plaintiffs want — would de facto establish judicial review of almost every government decision.

So far, the district court has okayed the public trust theory only because of global warming's impacts to coastal waters, tidelands, and navigable waters. But this is not much of a limitation. There are relatively few land-use activities that have purely localized impacts. Development, landscaping, grading, agriculture; all have complicated effects that can eventually impact complex environmental systems that are hydrologically connected to navigable waterways. Courts are

ill-placed to make the tough policy trade-offs required to balance economic development and property rights with environmental protection.

Such questions — which are especially thorny in the context of global warming — make

the efforts of the *Juliana* plaintiffs all the more worrisome. The explosion of wealth and progress over the last 150 years represents a triumph of humanity. The increase of greenhouse gases during that period was the trade-off. We now have a complex and difficult question before us: what will we trade for a world-wide reduction in carbon dioxide levels? The question is far from an easy one, and may become the defining question of the next generation. The *Juliana* lawsuit seeks to craft an answer through negotiations with a handful of plaintiffs and attorneys, and a single judge. That should frighten us all.



Jeremy Talcott

Jeremy Talcott is an attorney with Pacific Legal Foundation.

This Oregon-based nonprofit has brought similar climate youth litigation in state court in Colorado, Maine, Massachusetts, New Mexico, North Carolina, Washington, Florida, and Alaska.

Our Children's Trust spearheaded the climate youth litigation *Reynolds v. Florida* earlier this year. In that lawsuit, a diverse group of eight Floridians, ages 19 and younger, filed suit against the state and Governor Rick Scott for the "Defendants' deliberate indifference to the fundamental rights to a stable climate system" in violation of Florida common law and Article I, Sections 1, 2 and 9; Article II, Sections 5, 7(a), and 8; and Article X, Sections 11 and 16, of the Florida Constitution. The youths argued: "All of Florida's public trust resources, including without limitation, the atmosphere (air), submerged state sovereignty lands, lakes, rivers, beaches, water (both surface and subsurface), forests, and wild flora and fauna (individually, a "Public Trust Resource," and collectively, "Public Trust Resources"), are essential for life, liberty, pursuit of happiness, and property, including human habitation and personal and economic health, safety, and wellbeing."

Scott, who is now running for the U.S. Senate, is a noted climate denier. For example, in a 2010 interview aboard his campaign bus, when asked if he believes in climate change, he said, "I have not been convinced." When asked what he needs to convince him, he stated, "Something more convincing than what I've read." A few years later, he dodged the same question, saying only that he is "not a scientist."

In Alaska, last October some 16 plaintiffs, many of whom were minors, filed a lawsuit in state court against the state, its governor, and its agencies alleging that the defendants had violated "their inalienable and fundamental rights to life, liberty, property, equal protection, public trust resources, and a stable climate system that sustains human life and liberty." In *Sinnok v. State of Alaska*, the youth plaintiffs, represented by Our Children's Trust, argue that in implementing its "Climate and Energy Policy," which authorizes and facilitates activities producing greenhouse gas emissions and which does not implement needed climate mitigation standards, the defendants failed "to enforce Sections 1, 7, and 21 of Article I of the Alaska Constitution and Article VIII of the Alaska Constitution."

Moreover, the youth plaintiffs argue, "All of Alaska's Public Trust resources, including, without limitation, waters (surface, subsurface, and atmospheric), fish,

and wildlife, air (atmospheric), the climate system, the sea and the shores of the sea, submerged and submersible lands, beaches, forests, and tundra (each individually a "Public Trust Resource," and collectively "Public Trust Resources"), and correlative public uses to such resources, including, without limitation, public access, fishing, and navigation, are essential for Youth Plaintiffs' rights to life, liberty, and property."

This lawsuit is interesting in that oil and gas have represented the lifeblood of Alaska's economy. Beginning in 1982, a family of four would have received a total dividend payment of \$133,461 from oil and gas accounts. So this suit is hitting where it hurts in terms of the state's traditional economy, which the plaintiffs view as neglectful of their public trust rights.

These revolutionary persons' lawsuits in Florida and Alaska (and other states) mirror, in many respects, the legal arguments in the Oregon federal district court climate youth case. In the three suits, the climate youth plaintiffs argue that a government, whether federal or state, elected by and for the people has a duty to protect the public trust, which includes the atmosphere, for present and future generations. And if the executive and legislative branches of government fail to exercise that public trust duty, the judicial branch must intervene to reduce and mitigate any adverse effects.

Our Children's Trust is part of a coordinated effort "to support youth and attorneys around the world who are developing and advancing legal actions to compel science-based government action on climate change in their own countries." Our Children's Trust's U.S. and global lawsuits seek "climate justice," which is the term used for framing global warming as an ethical and political issue, rather than one that is purely environmental in nature. This is done by relating

the effects of climate change to modern concepts of justice, particularly environmental justice and social justice. The fundamental principle of climate justice is that those who are least responsible for climate change suffer the gravest consequences. Citizens, therefore, around the world are suing their own governments for failing to protect them. According to a May 2017 report issued by UN Environment and Columbia University's Sabin Center for Climate Change Law, there were more than 900 such cases in 24 countries seeking climate justice, with more than 654 in the United States alone.

In Alaska, 16 plaintiffs filed a lawsuit in state court alleging that the state had violated "their inalienable and fundamental rights," including "public trust resources, and a stable climate system"

Climate justice litigation has shown a considerable amount of success, beginning with the precedent-setting 2015 lawsuit *Urgenda Foundation v. Kingdom of the Netherlands*, brought by 900 citizens against the government. The plaintiffs were represented by the Dutch environmental group Urgenda Foundation. The citizens won, which resulted in the court ordering the government to cut greenhouse gas emissions nationwide by at least 25 percent by the year 2020 (compared to 1990s levels). The case was upheld on appeal on October 9.

This case laid the foundation for similar lawsuits around the world, all relating to the governments' obligations to mitigate climate change and grounded in part on rights-based theories rather than through reference to environmental statutory requirements. The Hague District Court in *Urgenda* said, "The state must do more to avert the imminent danger caused by climate change, also in view of its duty of care to protect and improve the living environment." Our Children's Trust continues to improve upon this rights-based litigation strategy with its climate youth lawsuits.

The Trump administration and the administrations of several state governments should heed the warning of one of the world's most noted social justice icons. The Reverend Dr. Martin Luther King Jr. once said that it is imperative before it's too late for humanity to "join with the Earth and each other, to bring new life to the land, to restore the waters, to refresh the air, to renew the forests, to care for the plants, to protect the creatures, to celebrate the seas, to rejoice in the sunlight, to sing the song of the stars, to recall our destiny, to renew our spirits, to reinvigorate our bodies, to recreate the human community, to promote justice and peace, to love our children and love one another, to join together as many and diverse expressions of one loving mystery, for the healing of the Earth and the renewal of all life."

Consistent with the thrust of Dr. King's words, young people in Utah, for example, were recently successful in getting the state legislature and the governor to issue the "Concurrent Resolution on Environmental and Economic Stewardship." In March, Governor Gary Herbert signed H.C.R.7, the concurrent resolution, that, among other things, acknowledges the state's tradition of stewardship of the natural resources and the environment; recognizes the need for responsible stewardship to mitigate the risks of, prepare for,

and address the changing climate and its effects; encourages the use and analysis of sound science to understand the causes and impacts of local and regional climates; and expresses a commitment to create and support economically viable and broadly supported solutions, including solutions in rural communities.

Still further, a tight-knit group of technologically savvy youngsters created a nationwide coalition called Zero Hour, an environmentally focused movement led by climate justice advocates. This youth movement is committed to pressuring governments to move faster on climate change policy and action. Last July — a day after the appellate court's decision in the *Juliana* case — Zero Hour members marched in Washington, D.C., Los Angeles, Seattle, and London, and met with various legislators to share their concerns about the lack of action on climate change by their governments. These kids will not stay silent on this issue. They are revolutionary persons.

In issuing a five-year strategic plan, EPA stated in 2010: "Environmental justice and children's health protection will be achieved when all Americans, regardless of age, race, economic status, or ethnicity, have access to clean water, clean air, and healthy communities." Or as Judge Aiken recognized more broadly in the suit before her in federal district court in Oregon, as described in the *American University Law Review*, "the right to a stable climate system, implicit in due process, is a constitutionally protected right, a consequence of the government's dominion over trust resources like submerged lands and oceans." Convincing a jury in her federal courtroom that that right has been abrogated by the government as trustee in ignoring greenhouse gas emissions and changing atmospheric conditions while supporting the fossil-fuel industry will be the job of the plaintiffs.

Watch the coverage of the lawsuit, which starts October 29. Outside the courtroom itself, this time the revolution is being televised, 24/7, and its precepts disseminated via Google, Facebook, and Twitter. The songwriter-poet Gil Scott-Heron would be proud of the grandchildren of the Baby Boomers who fought for the first racial justice and environmental laws. The kids support developing climate policy based on sound science, consistent with the principles of environmental justice and the federal and state constitutions. And as the 1950s chant regarding international coverage of civil rights events reminds us today, "The whole world is watching." **TEF**

The fundamental principle of climate justice is that those who are least responsible for climate change suffer the gravest consequences. Citizens, therefore, are suing their own governments for failing to protect them

A Voluntary Federal Framework

Establishing a nationwide system for carbon reporting and an offset exchange will empower states, municipalities, and businesses to decrease emissions while increasing investment in clean energy and improving transparency and accountability



Charles Hernick is the director of policy and advocacy at the Citizens for Responsible Energy Solutions Forum in Washington, D.C. Working in Africa, Latin America, and the Caribbean in addition to the United States, he creates and executes strategies to advance clean energy solutions and innovative approaches to reducing carbon emissions.

States and local governments have established their own policies to shift toward clean energy for over a decade, and the private sector is providing customers with more clean energy solutions in every part of the economy each new year. Hybrid cars are commonplace, electric vehicles are on the rise, homes and businesses are more energy efficient than ever, and utilities across America are providing renewable power on demand to corporate and residential customers.

As a result, U.S. greenhouse gas emissions have fallen to their lowest levels since 1991, and power-sector emissions are 28 percent below their 2005 peak. Thousands of companies and municipalities now calculate their emissions and have taken measurable steps to reduce their carbon footprint. Green bonds — financial tools often used to reduce greenhouse gas emissions — attracted over \$150 billion of investment last year, double what it was the year before.

While these are encouraging signs, there is opportunity to harness these decisions in a more comprehensive way. Currently, these actions are not reported to a single system where they can be aggregated, and their collective impact better understood and optimized. Beyond making reductions on their own, many businesses pay someone else to reduce, avoid, or sequester carbon because it's cost effective. In the United States alone, a \$28 billion a year offset credit market has grown to meet this demand.

Instead of superseding these actions and actors,

federal policymakers should build on the achievements of states and momentum inside the private sector by creating a voluntary reporting and offset exchange system that empowers additional actors and actions. A voluntary greenhouse gas emissions registry and standards for carbon offsets will mainstream emissions reductions efforts and increase capital investment in clean energy.

The pressure faced by Congress to address climate change — especially from millennials — and the Trump administration's simultaneous proposals to replace the Clean Power Plan call for pragmatic policy solutions. Focusing on reporting and offset exchanges is consistent with the market-based mechanisms that states have been using to reduce greenhouse gases for over a decade. Currently, 10 states use compliance-driven cap-and-trade markets; it's expected that 12 will do so within the next year.

Carbon capture and storage offsets may be a particularly important approach for CPP replacement rulemaking. It is more cost effective than ever since Congress established "45Q" tax credits for this type of voluntary offset early in 2018. However, there must be systems for accounting and transferability to assure American taxpayers of the value and longevity of this approach.

While a voluntary federal reporting and offset accountability system will not satisfy the proponents of firm-handed federal caps and mandates, it is the most politically viable approach to supporting states' rights and local action and guiding the invisible hand of free

markets to further drive down emissions and mitigate climate change.

Rapid adoption of corporate social responsibility practices, sustainability and even shareholder demands are causing many companies to voluntarily report and reduce their emissions. These private efforts are notable and shouldn't just be applauded—those emissions reductions should be counted.

There is substantial money flowing into these voluntary reductions. The market for green bonds has grown significantly. Green bonds are issued to finance projects — like wind and solar power installation, or capital investments in energy efficiency — with specific environmental outcomes, namely reducing carbon emissions. To date, these bonds have been issued by corporations like Apple and Starbucks, universities, and municipalities across the United States. The doubling of investment in green bonds in just one year happened in part because they are being bundled into mutual funds.

A strictly voluntary federal registry would assist organizations in measuring, reporting, and verifying the carbon in their operations so they can better manage and reduce emissions. As a voluntary approach, there would be no federal mandate, but there would be a national tracking mechanism that could link to, or build off, the existing mandatory federal carbon registry for power plants. A centralized reporting mechanism could be very helpful to the leaders of over 400 cities and municipalities joined together as The Climate Mayors to reduce their own emissions. Additionally, more than 3,500 mayors, governors, CEOs, college presidents, faith organizations, and tribal leaders have moved to similarly track and reduce emissions.

Sometimes it is more cost effective to reduce emissions elsewhere rather than cut emissions on your own. To that end, offset credits can be purchased voluntarily to compensate for emissions that occur elsewhere. Offset credits are generated by certified projects or activities that reduce, avoid, or sequester carbon — for example, by switching to cleaner fuel sources, by planting trees that pull carbon dioxide from the air, or by injecting carbon dioxide into the ground. These are *offset markets* in which a voluntary transaction takes place because the seller has a business interest in developing offset credits and the buyer is either seeking to reduce its own emissions or is

regulated and finds it more cost effective to purchase offsets.

The buyers of voluntary offset credits typically represent for-profit organizations from the energy, finance and insurance, consumer goods, and events and entertainment industries. General Motors is a top voluntary offset buyer, offsetting 8 million tons of carbon dioxide equivalent over five years, with a budget of \$40 million. Other top-offsetting U.S. corporations include Delta Airlines and Pacific Gas and Electric Company.

In the United States, dozens of businesses and organizations develop and sell offset credits totaling 10 million tons of carbon dioxide equivalent valued at \$28 million in 2016. Offset projects are spread across the U.S. Methane capture projects make up over 40 percent of the offset market and have been developed in every state. Many forestry projects take place in the Southeast and rice projects are common in the South.

To facilitate growth in offset markets, the federal government should develop guidelines for the voluntary exchange of carbon offset credits — it could, for example, establish common trading units for offsets. A federal standard could result in lower costs for local and state governments to meet emissions-reduction goals. By creating market standards, barriers for small businesses to engage these markets will be reduced and the door to additional markets that have emissions trading systems in Europe and China could someday open.

Creating a framework for common accounting could make local markets more efficient — and assure that voluntary developers of offset credits are accountable for the products they are selling. It may also be particularly important and useful for transparency, since Congress established a tax credit for carbon capture and storage as the first mechanism for voluntary offsets purchases by the American taxpayer.

Focusing on a voluntary reporting and offset exchange is consistent with the market-based mechanisms to control pollution that states have been using for reducing greenhouse gases for over a decade. Indeed, it would preserve states' rights and leadership in this space. Market-based instruments encourage be-

A strictly voluntary federal registry would assist organizations in measuring, reporting, and verifying the carbon in their operations so they can better manage and reduce emissions

havior change — they guide the invisible hand through changes in prices, rather than through explicit directives regarding pollution-control levels or methods. Market-based approaches encourage businesses or individuals to undertake pollution-control efforts that are in their own interests and that collectively meet policy goals if they are well designed and properly implemented.

As they relate to limiting carbon emissions, market-based instruments can be grouped into three categories: government subsidies to clean energy generation, carbon taxes, and tradable carbon emissions permits or allowances. Consistent with the first approach, states have provided *subsidies* to zero or low-carbon power sources through renewable portfolio standards. RPSs require the increased production of energy from sources such as wind, solar, biomass, and geothermal. In practice, this has created an economic incentive to develop solar and wind projects in particular. Roughly half of all growth in U.S. renewable electricity generation and capacity since 2000 is associated with state RPS requirements. However, these systems can be complex and vary state by state. For example, 29 states use 10 different systems for accounting for RPSs, complicating trading across the country.

A subsidy through direct clean energy tax cuts, however, has never been implemented in any state or at the federal level. While tax credits for solar and wind investment and production are in place, they are scheduled to phase out over the next few years because these subsidies were originally intended to help a nascent market get off the ground. Mature markets don't need help from Uncle Sam. It's possible to go further and pursue supply-side *clean tax cuts*. Basic logic dictates that if you want more of something, tax it less. Tax cuts linked to carbon emissions would put a price on carbon by rewarding capital flows to carbon-conserving solutions. This approach requires accounting for carbon reductions, monitoring, and enforcement.

The second type of market-based approach is a carbon tax, which would limit emissions by increasing business costs for carbon-intensive industries. In economic terms, the tax shifts the

marginal private cost curve; it is a Pigouvian tax. While carbon taxes have been proposed in various formations at the state, regional (via PJM Interconnection), and federal level, to date no carbon taxes have been implemented in the United States. A key challenge is establishing the level. Any schedule for tax increases must be set by one-time legislation, since Congress will have a hard time adjusting the tax once it is established. The federal gas tax for highway funding — which hasn't changed since 1993 — is an indication of how hard it is to adjust taxes once they have been established.

Setting the tax escalation rate depends on difficult-to-make assumptions about technological innovation over the period of the policy. If the tax is too high, a rapid shift in the energy market could displace workers and shock the economy. If the tax is too low, the policy won't achieve emissions reductions goals. There are also major questions about what to do with the revenue collected from a carbon tax. Some have suggested carbon dividends, which would provide direct payments to Americans. But other carbon tax proposals would direct cuts to the corporate tax rate to assure revenue-neutrality and eliminate any additional government bureaucracy needed to administer the program and calculate dividends. However, an additional significant challenge is that a federal carbon tax would need to be wedded with the state-level efforts to decrease emissions through carbon trading.

Carbon trading — more formally tradable carbon emissions permits or allowances — is the third type of market-based approach. While in the halls of Congress, *cap-and-trade* has been out of favor for years, at the state-level this market-based approach has firmly taken root. Just last year, nine northeastern and mid-Atlantic states renewed their participation in the Regional Greenhouse Gas Initiative, and California, America's most populous state, extended its cap-and-trade system too. These are compliance-driven

A centralized reporting mechanism could be helpful to the leaders of over 383 cities and municipalities joined together as The Climate Mayors to reduce their own emissions

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Verification, Accreditation Provide Assurance

President Reagan famously said, “Trust but verify.” What applied to negotiations with a nuclear-armed and sometimes hostile Soviet Union may apply to today’s situation with verification of carbon reductions by countries and by companies, all of which are in competition with each other. It is also necessary to ensure the competency of third-party verification bodies, a process called accreditation.

Verification bodies evaluate the accuracy of an emission claim. Accreditation ensures that verification bodies are up to the task. Recent history with both mandatory and voluntary systems shows that this double layer of accountability can provide the assurance needed to meet Reagan’s dictum.

There is already a rich array of experiences implementing carbon reduction programs. The World Bank’s Carbon Pricing Dashboard, which provides information on existing and emerging carbon pricing initiatives, lists 51 globally. As a result, we already have several lessons learned about what frameworks work best.

A central lesson is you need a system that builds capacity. Many programs have made improvements over time in response to stakeholder feedback, analysis of results, and, frankly, mistakes. Continual improvement harmonizes processes and cultivates best practices, which strengthens the institutions involved with the carbon abatement scheme. Efforts undertaken by organizations such as the International Organization for Standardization, the UN climate convention, and the World Resources Institute harmonize reporting and verification frameworks globally, improving the overall system of accountability.

Another lesson is that to achieve credible reductions, a co-

herent framework of clear rules and oversight is essential. For example, the Kyoto Protocol’s Clean Development Mechanism provides for Certified Emission Reductions generated by projects located in developing countries. CERs are based on approved methodologies, and validated and verified by an accredited third party.

Similarly, in Canada, provinces with GHG reporting requirements for industry require third-party verification. The majority of provinces require verification by a body accredited by an International Accreditation Forum member against international standards.

In California, a state program has had great success with similar components. The EU’s Emissions Trading Scheme has continued to improve with the implementation of program reforms and harmonization of accredited verification. Countries such as Kazakhstan and Singapore are establishing similar programs and supporting institutions.

What these programs all have in common are clear rules for reporting GHG emissions and supporting layers of quality assurance. This includes clearly defined roles and responsibilities for participating institutions.

As an example, the International Civil Aviation Organization Council recently adopted reporting and verification rules for the Carbon Offsetting & Reduction Scheme for International Aviation. CORSIA is a global system to address annual increases (above 2020 levels) in total CO₂ emissions from international civil aviation. Airlines will be required to calculate emissions from flights and offset them. Doing so will require third-party accredi-

ed verification, competent to carry out assurance of GHG estimates.

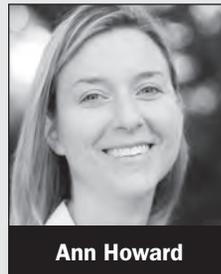
ICAO recognizes that “capacity building efforts and partnerships must be strengthened in order for ICAO member states to implement what is needed in a short amount of time.” Capacity building here helps not only the aviation sector but also efforts to strengthen national reporting programs.

While assurance that the verifying is done well is sometimes lost in the larger picture, it also plays a leading role. Ensuring that there are sufficient accredited verification bodies in emission trading schemes is an essential first step.

There are over forty accreditation bodies operating GHG programs against international standards and many in development. While the GHG schemes they work with vary from one region to the next, the approach to third-party verification is harmonized and focused on continual improvement.

This quality is achieved through Multilateral Recognition Arrangements. An MLA provides confidence that verification bodies and their activities are assessed equally and consistently by accreditation bodies against international standards and GHG scheme requirements. Such schemes are increasingly interested in utilizing this framework to ensure quality and drive continual improvement.

Climate change is a collective-action program. Without cooperation and coordination, effective mitigation cannot be achieved. Luckily there is an existing framework already established to help.



Ann Howard

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cap-and-trade markets. Businesses participate by buying a limited number of emissions allowances sold at auction or by trading unused credits among each other. Right now, nearly one-third of the U.S. economy is already under a compliance-based cap-and-trade program. RGGI states plus California make up 30 percent of our national gross domestic product. If Virginia and New Jersey join the initiative, as their governors anticipate, then over 35 percent of the U.S. economy will be within one of two cap-and-trade systems.

Concerns that a regional cap-and-trade system would create a costly bureaucracy and that markets could be manipulated have proved unfounded. RGGI held the program's initial auction in September 2008 — the very same month the stock market crashed, bringing on the Great Recession. The RGGI model focused on accountability and transparency, and carbon prices have been lower than expected and the auctions and trades worked as planned. The long-term commitment to RGGI provided enough business certainty for industry to justify investing in clean energy resources, research and development, and updated infrastructure.

The results speak for themselves. Since RGGI was established in 2005, carbon dioxide emissions are down 45 percent and ratepayers have saved billions on their utility bills. The new goal agreed to in 2017 is to reduce the carbon emissions cap by another 30 percent between 2020 and 2030.

This growth is important because cap-and-trade systems become more economically efficient with more states and businesses participating. Larger carbon markets with more competition and options help keep the costs of compliance down.

A voluntary reporting and offset exchange system could make sense of the myriad approaches by states and the private sector by consolidating data and making it more publicly accessible. The benefit to opting into a voluntary system is federal assurance of full public disclosure. A limited federal effort could help protect investors and maintain fair and orderly functioning of voluntary carbon markets. State-level compliance markets would still need their own enforcement mechanisms. But for private actors in the voluntary space, the federal stamp of recognition could crowd-in investment. Perhaps most importantly, a voluntary greenhouse gas emissions registry and standards for carbon off-

sets will not invent a new federal system that attempts to supersede state progress.

Establishing consistent rules for measurement and exchange could be the missing piece to magnify the impact of the free enterprise system and avoid the legal challenges certain to continue following the Clean Power Plan and its proposed replacement.

Last August, EPA proposed the next regulatory steps to limit carbon emissions from existing power plants. To avoid lawsuits, the Trump administration's final Affordable Clean Energy rule must both stay within the limitations of the Clean Air Act as defined by Congress and must be responsive to the Environmental Protection Agency's 2009 endangerment finding. EPA's approach is constrained by CAA Section 111(a) (1). This part of the law limits the scope of regulation to technologies that can be applied to a single stationary source — the power plant. This is also known as an *inside the fence* approach that regulates each power plant and smokestack individually. EPA's mandate under Section 111(d) is limited to writing guidelines for states, so that state-level plans can be approved by the federal government. To inform this guidance, EPA's rule will focus on

the definition of a standard of performance or Best System of Emission Reduction. In other words, how much can emissions be reduced with an acceptable level of financial strain on the power plant?

This type of technology- and performance-based standard is classic command-and-control policymaking. These standards prescribe uniform requirements allowing relatively little flexibility in terms of how goals will be achieved. Although standards may be effective, forcing all businesses to resort to equally expensive means of controlling pollution can lead to relatively high total compliance costs. Because the costs of controlling emissions may vary greatly among power plants, and even among sources within a single plant, the appropriate technology in one situation may not be cost-effective in another. Control costs can vary enormously due to production design, physical configuration, age of assets, or other factors.

Experts say it is not entirely clear how much more can be done to improve coal plant efficiency, at least not without dramatically raising plants' costs. For example, heat rate improvements were one of the proposed emission-reduction strategies described in the

Since the Regional Greenhouse Gas Initiative was established in 2005, carbon dioxide emissions are down 45 percent and ratepayers have saved billions on their utility bills

final version of the Obama CPP; but even regional targets may prove too costly to achieve. Plant-by-plant emissions targets are possible but represent a very heavy-handed approach.

A narrow reading of the act and an inside-the-fence power plant standard of performance is sound from a legal and technical standpoint, but it's not the most cost-effective means for precise emissions reductions. Indeed, it risks ignoring a decade of policy leadership and capital investment by states and businesses. It could bring us back to command-and-control methods for reducing pollution. Only allowing reductions to occur within the fence is unnecessarily narrow. Carbon dioxide and other greenhouse gases are global pollutants. From a global climate change viewpoint, reducing emissions at the power plant is the same as reducing emissions anywhere else. In other words, as far as carbon in the atmosphere goes, avoiding a ton of emission from a power plant is the same as sequestering a ton of carbon through a forestry project. That's why market-based approaches make the most sense for carbon.

Considering the opportunity for offsets and the use of compliance-based cap-and-trade by 10 states, EPA should focus on creating a flexible approach to limiting carbon. States possess — and must be guaranteed — considerable flexibility in developing their plans. EPA should create options for limiting emissions reductions inside the fence and establish a mechanism for purchasing verified offsets outside the fence. Furthermore, allowing for a broad definition of how the cost calculations can be developed may allow third-party investment via offsets or green bonds to minimize costs to ratepayers. This represents a key opportunity for enabling carbon capture and storage. CCS involves turning the smokestack on a power plant upside down so that emissions are stored underground instead of released into the atmosphere. While there are numerous geologic conditions that need to be just right, the technology exists and works but thus far isn't cost effective outside of enhanced oil recovery operations.

Establishing consistent rules for measurement and exchange will make market-based solutions more transparent and unleash the free enterprise system to achieve emissions reductions goals. A voluntary greenhouse gas emissions registry and guidelines for the exchange

of carbon offset credits will help raise the profile of existing voluntary actions that take place absent government regulation and help crowd in investment. The federal government should encourage buyers in this market motivated by self-defined environmental goals and sellers motivated by environmental interests and economic gain.

Several certification processes and non-governmental organizations verify offsets. Demand has been consistent for years. But the market could be bigger and offsets could play a larger role in driving down emissions if offsets were allowed by EPA's new rule. Allowing offsets would create technical options for minimizing the cost of carbon emissions reductions.

An era with blossoming financial instruments, multiple means of measurement, and poor market coordination is not unprecedented. Before the stock market crash of 1929, most investors gave little thought to the systemic risk that arose from poor information and the need for basic market rules. The crash was a devastating way to learn a lesson about the need to protect investors and maintain orderly, functioning markets. Out of the ashes, the Securities and Exchange Commission was established to protect investors and markets and to facilitate capital formation. The result has been an economy that remains the envy of the world. With a plethora of market-based approaches being implemented to limit carbon across the United States, a similar approach based on coordination and protection could be helpful to meet today's challenges.

By establishing a voluntary federal greenhouse gas emissions registry and a system for the voluntary exchange of carbon offset credits, the federal government won't dictate how carbon emissions will be reduced. It will establish a reliable economic and environmental framework that could help unleash the *market's* potential to solve the problem. By promoting public disclosure and a common accounting system for carbon trades, private and public actors at all levels will get credit for emissions reductions that are already taking place. And there will be a bigger spotlight on those actors who are leading emissions reductions. Improved information and clear market signals will help guide finance, including green bonds, to clean energy. The result could be very powerful. And make the United States' market-based approach the model for how to solve the climate change problem. **TEF**

By establishing voluntary systems for greenhouse gases and offset credits, the federal government will establish a reliable framework that could help unleash the market's potential to solve the problem

Reconstruct an Administrative Agency

By examining the structures that Scott Pruitt dismantled during his tenure at EPA, the agency's mission comes into focus and a blueprint for rebuilding its functions is revealed — if successor Andrew Wheeler likes the shape intended by the pollution statutes' drafters



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EDITOR'S NOTE: The *Forum* invited EPA Acting Administrator Andrew Wheeler to submit a Sidebar to accompany this article, but an agency spokesperson declined on his behalf. We have invited Mr. Wheeler to write a feature essay in a future issue.

BE GRATEFUL TO EVERYONE.” Buddhists in Tibet say this to remind themselves that adversity offers a path to enlightenment. In that spirit, this is an overdue thank you note to former administrator Scott Pruitt, for reminding us what EPA is for. His efforts to roll back a host of air, water, and waste rules have forced us to recognize the extent to which those regulations reduce pollution and protect the environment.

First, a measurement of his tenure's impact. David Cutler and Francesca Dominici, two public health experts at Harvard University, recently published a column in the *Journal of the American Medical Association* quantifying the impact on human lives and health as the critical metric for the stakes of the Pruitt EPA's deregulatory agenda. They pegged the number of Americans facing premature death over the next decade at an additional 80,000, thanks to his regulatory rollbacks. And that may be a conservative estimate.

It gets worse. Beyond highly publicized changes to pollution standards, Pruitt took on a less visible, if more destructive, project. Like King Arthur confronting the Black Knight in *Monty Python and the Holy Grail*, Pruitt has lopped off the agency's critical limbs, disabling its capacities and diminishing its public health agenda. He attacked the very mechanisms EPA relies on to create and enforce pollution rules. But unlike the Black Knight, the professionals who work at the agency and their pollution-fighting colleagues in industry, NGOs, law firms, and state governments are not ignorant of the agency's diminished abilities.

EPA is an agency built to fill a variety of roles, all rooted in scientific, analytic, and technical expertise. That expertise is intended to benefit the public, by informing rulemakings and guidelines for states and businesses to follow to reduce harmful pollution. It was, with some exceptions, also used to ensure compliance with those rules and enforce them. EPA carried all this out under a mandate to keep the trust of a well-informed public and to be accountable to that public.

In his short tenure at the agency, Pruitt moved against almost all of these critical functions, from the way the agency evaluates and applies science, to how it collects information, fosters compliance, and pursues enforcement. Even the way EPA assesses the public health benefits of reducing pollution fell into Pruitt's destructive path. Oblivious to the agency's protective mission, he seized upon former Trump advisor Steve Bannon's call to “deconstruct the administrative state”

and made it his literal-minded mission to curtail, if not shut down, his branch of the targeted organism.

After Pruitt resigned in July, Deputy Administrator Andrew Wheeler became acting and the front-runner for the permanent job. Wheeler continues to follow the same deregulatory agenda outlined by the president and enacted by Pruitt, but with a different leadership style. The divergence between Wheeler and

across the federal government. Rather, it is in the substantive statutes — the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, and Superfund, to name the most important — that we can find the agency's purpose. It is through these laws that Congress asserted its role and built the agency by assigning it specific tasks. Over time EPA acquired or expanded

the functions needed to perform those tasks. Pruitt took aim not just at these protective rules but also at the usually dovetailed capacities to promulgate them and to carry them out.

In this article, we will take as an example the Clean Air Act to shed light on the functions the agency has needed to master to do its job — and how Pruitt has sought to hamper EPA's smooth operation. Enacted in its modern version in 1970 and extensively amended in 1977 and 1990, the CAA offers a good look at the de facto blueprint Congress followed in building EPA. Congress made the law's overriding purposes clear: to enhance air quality for the sake of public health, welfare, and productivity; to promote research and development in service of pollution control; and to



Pruitt may be visible in the extent to which the new chief seems to follow administrative procedure and other standard processes, in contrast with the often corner-cutting work Pruitt's EPA produced. Gone, too, thanks to Pruitt's departure and Wheeler's apparent probity, are the innumerable scandals that swirled around the former's personal conduct and spending. Wheeler's seasoning thanks to time spent as an EPA career lawyer and senior staffer on the Senate Environment and Public Works Committee seems to count for something.

The Environmental Protection Agency wasn't created by a comprehensive, organic statute laying out its mission and functions. The executive order forming EPA focused simply on rehousing under one roof a variety of research, monitoring, standard-setting, and enforcement activities that were previously spread

provide financial assistance to states and localities in support of anti-pollution programs. Where Congress did its concrete agency-construction, though, was in charging EPA with numerous building-block tasks. These include setting ambient air quality standards to protect human health, determining how best to achieve emissions reductions, establishing technology-based standards for industry, setting tailpipe pollution standards, performing risk and technology reviews for toxic air pollutants, equitably allocating pollution-control responsibilities among local sources in polluted areas along with upwind sources, and considering cost and available technology for many of these jobs.

The standards and requirements that these tasks produce are directions to states and businesses to take the actions needed to reduce pollution. Public health benefits depend, in turn, on governments and firms complying with those directions and achieving reductions. Congress assigned EPA the task of ensur-

ing, via compliance assurance or enforcement, that they do so.

The task list thus demands an agency that possesses expertise in relevant sciences — notably public health, epidemiology, and biomechanics, along with atmospheric chemistry and physics — as well as engineering, technology, and economics. The job list also demands competency in detection, monitoring, and information-gathering in support of EPA’s obligation to ensure compliance with pollution limits.

The authors of the CAA were not done with tasks, however. Grasping the progressive nature of science and technology, and the dynamics of a market-based economy, Congress committed the agency to continual, open-ended improvement, requiring EPA to ensure that progress is reflected in the level of protection delivered to the public. Thus, the statute mandates that the agency review health-based standards every five years and technology-based standards every eight years — and to change them if new information compels. Congress considered this ongoing cycle of tasks so vital that it authorized any member of the public to sue EPA for failing to meet these deadlines, and the courts to order the agency to meet a schedule for completing the reviews and rule-makings in each case.

This last task, thus, is accountability, which falls as much to the public and the courts as to EPA. This accountability ethic Congress established is in addition to the formal accountability created by the Administrative Procedure Act and sections 307(b) and (d) of the Clean Air Act.

The Environmental Protection Agency has historically relied on the best available peer-reviewed science in carrying out its mission. With his “Strengthening Transparency in Regulatory Science” proposal, Pruitt sought to restrict the science EPA will consider. The proposal effectively excludes two gold-standard public health studies, by the American Cancer Society and Harvard University, that show the health threats and increased mortality from particulate pollution, which kills or harms more Americans than any other form of pollution.

The proposal made by Pruitt in April would bar

the agency from considering scientific studies unless the raw data were made publicly available. The proposal offered a barely coherent explanation for why the data-availability requirement is needed for studies that had already undergone peer review and the other quality-assurance processes of state-of-the-art science. What is clear, however, is that the proposal attacks the foundational ACS and Harvard studies, because both rely on a large body of confidential patient data that legally cannot be made public.

These thoroughly reanalyzed and replicated studies, long relied on by the world’s leading researchers, have also long been relied on by EPA. The result of this policy will be to hamstring the National Ambient Air Quality Standards program that drives air pollution controls and the agency’s mandatory work in evaluating the costs and benefits of reducing pollution. It’s easy to understate benefits when doing these calculations, especially if the benefits of reduced mortality and illness as assessed through confidential surveys are excluded.

Because science is central to so many of the agency’s tasks, EPA has long since absorbed the fundamental principles of scientific inquiry. None is more vital than that of following the data and analysis to where they lead rather than leading the data and analysis to a predetermined destination. In advancing a “science” proposal so clearly designed to deliver a preferred result — excluding studies that support

the case for regulating particle pollution — Pruitt committed what remains a cardinal sin outside the administration: corrupting the scientific method and suborning it to a pre-ordained agenda.

The science advisory panels EPA has relied on, through both Democratic and Republican administrations, have been objective, independent, highly qualified, disinterested, and rarely, if ever, legitimately questioned. But Pruitt has purged the panels, ushering out independent academic experts and replacing them with scientists affiliated with the very firms under regulation. By one count, during Pruitt’s tenure the proportion of leading academics on the main Science Advisory Board fell from 79 percent to 50 percent and the proportion of industry-employed scientists rose from 6 percent to 23 percent.

In an October 2017 directive, Pruitt decreed that

EPA has long since absorbed the principles of scientific inquiry. None is more vital than following the data to where they lead rather than leading the analysis to a predetermined destination

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Pruitt's Gone, But Wheeler Carries on Agenda

Scott Pruitt's 16-month tenure as EPA administrator turned out to be a mixed bag. When President-elect Trump nominated Pruitt, he thought he was getting exactly what he wanted: an aggressive outsider; an able public advocate; and, most importantly, someone who as Oklahoma's attorney general had shown that he was just as opposed to Obama's climate agenda and regulatory onslaught as was Trump.

Pruitt turned out to be suitably aggressive and an energetic promoter of Trump's policies. Most notably, he provided stalwart support inside the administration and in public of the president's decision to withdraw from the Paris climate treaty. But he also turned out not to be a hands-on administrator. Repeals of major rules were regularly announced, but the legal paperwork often turned out to be sloppy and the process of moving rulemakings forward often seemed stuck in neutral.

Pruitt came to the job without any experience of working inside the EPA or of managing a large organization. What he needed was a competent deputy administrator who had worked at EPA and knew how it operated and where the roadblocks were. That person was Andrew Wheeler, but the president's dysfunctional personnel process didn't manage to nominate Wheeler until October 2017 and the Senate didn't confirm him until April.

By the time Wheeler was sworn in, Pruitt was under assault for ethical lapses by environmental pressure groups and the mainstream media. The charges against him were mostly small potatoes, some were ridiculous, and even the serious ones were hardly unusual. One of the most serious was that he rented a bedroom in a condo on a \$50 nightly basis from a K Street power couple. It does look improper, but

it had been cleared by EPA's ethics counsel. Compare the endless recycling of this story to the big news in 2010 that Treasury Secretary Timothy Geithner had lived rent-free for nine months in a \$3.5 million house owned by a Wall Street executive. But the story of Geithner's special deal (which also had been cleared by his agency's ethics counsel) disappeared in a couple days.

Regardless of the magnitude of the offenses, Pruitt did a poor job defending himself. Time and again, he appeared arrogant and tone deaf. And he should have been prepared for the unrelenting attacks, but was not. In particular, in taking on the EPA bureaucracy, Pruitt seemed unaware of the magnitude of the challenge. He would have done well to study what happened to the only previous administrator who tried. Anne Gorsuch Burford was an outsider picked by President Reagan in 1981 to reform what was already an out-of-control bureaucracy. She was run out of town in 1983.

Andrew Wheeler is now acting administrator and may be nominated after the election to be administrator. I have known and occasionally worked with Wheeler for two decades and can attest to his commitment to and competence in getting the job done. It is a high recommendation that he has worked in his career for two great Americans — for Senator James M. Inhofe on the staff of the Senate Environment and Public Works Committee and for Bob Murray of Murray Energy as a lobbyist.

There is no doubt that Wheeler will continue to implement the de-regulatory agenda. That's because it's President Trump's agenda, which is based on a coherent set of campaign promises. The Waters

of the United States Rule will be replaced with something that is constitutional. The so-called Clean Power Plan will be replaced with something that is legal. And so on.

On whether Wheeler succeeds in his second main charge — reforming the worst aspects of the agency in terms of mismanagement, lack of accountability, and freelance regulating far beyond what Congress has authorized — history says no (see Pruitt and Burford). On the other hand, Pruitt hired an expert in management and re-organization from Arizona state government, Henry Darwin, as chief operating officer. Darwin has now been named acting deputy administrator.



Myron Ebell

To reform one of the swampiest bureaucracies is a challenge. As a former official who served under Carol Browner in the Clinton EPA said to me at the height of the Pruitt furor, "We learned early on that you don't ever want

to cross senior EPA career staff." To make progress, Wheeler and Darwin are going to need help from Congress. The signs are not good. OMB Director Mick Mulvaney requested a 31 percent cut in EPA's budget for FY 2017. The Republican Congress pulled that back to 6 percent.

It's not going to be possible to reform EPA's recalcitrant bureaucracy without deep staff cuts. Much of the agency's work, especially in terms of monitoring and enforcement, has been turned over to state agencies. Having lots of spare regulators with time on their hands and mischief on their minds will always lead to free-lancing and over-regulation.

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no one will be allowed to serve as an advisor who has received a grant from the agency — a condition that mostly affects academic experts who routinely receive government funding for research. Never mind that at least one federal appeals court has already found that “working for or receiving a grant from [an agency], or coauthoring a paper with a person affiliated with the department, does not impair a scientist’s ability to provide technical, scientific peer review of a study sponsored by . . . one of its agencies.” Meanwhile, Pruitt’s novel theory of “independence” features no such exclusion for experts working for industry even if their firm is regulated by the agency. Nor does it offer any explanation of what it is about being affiliated with a corporation that demonstrates a scientist’s independence.

Now the SAB and other reconstituted science panels will guide EPA on important decisions like health-based ambient air quality standards, determinations of acceptable risk levels for exposure to toxic chemicals, assessments of the net carbon impact of burning biomass, studies of the impact of hydraulic fracturing on drinking water, and how to value human life for purposes of economic analysis.

If anything in the CAA is sacrosanct it’s the requirement that EPA set NAAQS exclusively on the basis of science. Both the statutory language of Section 7409(b) and a unanimous Supreme Court decision exclude other considerations, even those of cost and feasibility. Once new standards are set, importantly, the action-based provisions of the act are set in motion to reduce air pollution, and these provisions put cost and technical feasibility front and center. As the Court found, NAAQS are based on answering only the question, What air quality is the science telling us is safe for human health?

But in May, Pruitt issued a memo that threatens to undermine the integrity of the standard-setting process. Until then, the various steps EPA followed to propose and then, after public comment, issue final NAAQS were carefully phased. The phasing ensured that the NAAQS-setting process focused exclusively on the science of human health, and was insulated from other considerations. The Pruitt pro-

cess collapses steps so that the Clean Air Act Science Advisory Committee and the agency itself will be compelled to review science, cost, technology, and implementation together in a single step, not separately. That is obviously contrary to what the Court has decreed is the legislative purpose of the NAAQS process.

Another essential principle EPA must follow in carrying out its tasks is accurately assessing the public health benefits of pollution reduction. Since at least October 2017, the agency has engaged in a coordinated series of attacks on how the benefits of pollution reduction are defined and quantified. For Pruitt, and now Wheeler, denying health benefits and changing how they are weighed in cost-benefit analyses helps clear the path to deregulation and inaction. For an agency dedicated to carrying out the tasks assigned to it under the CAA, embracing an “all-seeing” ethic is essential. If EPA applies analytic tools that blind it to the benefits of reducing harmful pollutants, then it need not take further action to cut pollution.

The Affordable Clean Energy and Clean Power Plan repeal proposals include Regulatory Impact Analyses featuring the domestic (but not global) benefits of reducing carbon dioxide emissions. Repeal model runs accounting for particulate reduction benefits show the repeal as unjustified by benefit-cost analysis. One repeal RIA run, however, zeroes out the value of particulate pollution-reduction benefits of the CPP if they would have occurred in areas already

meeting ambient air quality standards. It’s the only run where benefit-cost analysis justifies the repeal.

The premise of the analysis was that reducing pollution beyond the NAAQS had no beneficial effect and thus no value, even though major studies — designed to discern the realities of public health — contradict the zero-benefit premise. Most recently, for example, “Association of Short-term Exposure to Air Pollution With Mortality in Older Adults” in the *Journal of the American Medical Association* shows — as did the Harvard study now besieged by the “secret science” proposal — that fine particle pollution, even in concentrations below the current NAAQS, drive up mortality across the country. But if the answer to every question has already been decided as “no new regulation,” then imposing devices so as not to see

The proposed repeal of the Clean Power Plan features only the domestic benefits of reducing CO₂. It justifies repeal only by placing a zero value on the reduction in dangerous particulate pollution

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Waiting to See if Promises Made Are Kept

When it comes to regulations, small businesses bear a disproportionate amount of the burden. This is not surprising, since it's the small business owner, not one of a team of "compliance officers," who is charged with understanding new regulations, filling out required paperwork, and ensuring the business complies with new federal mandates. The small business owner is the compliance officer for his or her business. Every hour spent understanding and complying with federal regulation is one less hour available to service customers and plan for future growth.

Under President Obama, the regulatory burden on small business dramatically increased, in large part due to actions taken by the Environmental Protection Agency. EPA regulations impose significant costs on small businesses operating on razor-thin margins and impact businesses' land use. In 2012 and again 2016, environmental regulation shot up as a significant issue that small business owners cited when explaining why they could not grow as documented in our quadrennial "Small Business Problems and Priorities" report.

America's small business owners view President Trump's commitment to rolling back unnecessarily burdensome and duplicative regulation as one of his administration's greatest accomplishments to date. EPA, in particular, has made important regulatory promises — promises that America's small business owners expect the agency to keep.

Under Administrator Scott Pruitt and now Acting Administrator Andrew Wheeler, the Trump EPA has made a positive shift in its regulatory footprint over America's job creators. The agency's commit-

ment to going "back to the basics" and focusing on its core mission was welcome news to small businesses who viewed the Obama EPA as extremely aggressive in acting outside of its statutory authority and imposing new mandates on them.

And small businesses were pleased with Pruitt's announcement directing EPA to discontinue the extortionist practice the agency had engaged in for years known as "sue and settle," in which EPA would "settle" litigation brought by outside groups that often resulted in new regulatory burdens on entities that were not even parties to the original lawsuit.

But there is still work to be done.

What is and is not land over which the EPA has regulatory jurisdiction for purposes of wetland permitting under the Clean Water Act has been a debate that has raged on for decades. President Obama's EPA worked to solve the problem by claiming that when it came to where water travels, even during a few days or weeks of the year, there are precious few parts of the country containing truly intrastate wetlands subject only to state regulation.

The Waters of the United States rule issued in June 2015 has had a significant financial impact on many small businesses, who often have been prevented from doing anything with their property, which frequently is their biggest asset. Under Pruitt, EPA announced that it would revisit the rule and constitutionally rebalance it so that states, not the federal government, have primary regulatory authority over intrastate wetlands. Despite an Executive Order directing such action and agency promises to

fix the problem, however, nearly two years into the administration, small business is still waiting for a regulatory proposal.

A little more progress has been made to eliminate some of the costliest parts of the Clean Power Plan rule that would have compelled states to find a mix of alternative energy sources, like wind and solar, to make up for the shuttering of coal-fired power plants. EPA admitted that the rule, which is currently subject to a Supreme Court stay, would significantly raise the cost of electricity and threaten its reliability.

Our research shows that the cost of electricity is already a

top concern among small business owners across the country. Small businesses would be squeezed between higher direct expenses and lower consumer demand resulting from higher home electric bills. In August, the

agency issued a proposed rule-making that small businesses hope would have a much lesser economic impact on small business than the Obama rule.

Pruitt took positive steps to reduce the impact of environmental regulation on small businesses. As acting administrator, Wheeler has promised to continue this important work, which would alleviate a lot of the regulatory pressure small businesses face today. America's small businesses remain optimistic that this will be another promise made, promise kept.



Karen R. Harned

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these results and the reality they reveal is vital. Again, this negative example reinforces the fact that public health protection depends on EPA's commitment to rigorous and open-ended scientific inquiry.

Fortunately, Congress did not leave the public entirely defenseless in the face of an untrustworthy EPA. Via notice-and-comment rulemaking, the right to petition the agency for reconsideration, and the right to petition the courts for review of rules, citizens have a fairly robust set of tools by which to hold the agency accountable for meeting its obligations. Congress reinforced the seriousness of EPA's requirement to review health and technology standards by giving the public the right to enforce the obligation in federal court if the agency misses a deadline. Historically, EPA has effectively embraced and facilitated its accountability by working with litigants to resolve these lawsuits via settlements establishing mutually agreed upon schedules and accepting in those settlements the complaining party's statutory right to collect attorney's fees.

In an October 2017 directive, however, Pruitt added a set of new obstacles to the public's effort to exercise that right. Under the directive, citizen litigants hoping to reach agreement with EPA on deadlines will face both a set of new procedural hurdles and a playing field tilted in favor of regulated businesses. Contrary to past practice, they will be at much greater risk of having to foot their own legal bills, even if they ultimately succeed in reaching settlement with the agency.

Pruitt's rationale for the directive was so lacking in foundation that more than fifty retired career EPA attorneys issued an extensive public rebuttal of its assertions, noting that the directive makes inflammatory and evidence-free allegations about "collusion" between government attorneys and litigants and ignores a recent Government Accountability Office report that found no basis for those claims.

One of the hurdles to settlement the directive introduces also creates an entirely new advantage for industry by requiring business sign-off before the agency agrees to a settlement. While the rationale Pruitt offered for the directive was hazy, the intend-

ed effect is crystal clear: to make it harder for the public to hold the agency accountable by making it that much more unlikely that actions to enforce EPA deadlines will be resolved by settlement, rather than costly litigation.

To deliver on its purpose of protecting the public from pollution, the Clean Air Act requires the agency to ensure that polluters reduce emissions and discharges. To do that, EPA can engage directly with sources to offer assistance and, if that fails, bring enforcement actions. Pruitt cut back on one of the pillars of these useful activities. The agency's ability to collect reliable and timely information from polluters both assures compliance and enables enforcement actions when needed. While most firms are committed to staying in compliance, that commitment is strengthened if they can count on EPA to gather the information needed to ensure that their competitors are also in compliance, leveling the playing field.

EPA's nationwide network of 10 regional offices and subsidiary offices has historically been the cornerstone of information-gathering. They were authorized to request information as part of their frontline responsibility for identifying environmental non-compliance and even environmental crimes associated with waste dumping and illegal levels of pollution, and enforcing the environmental laws.

But Pruitt required regional personnel to clear each information request through headquarters. The immediate effect of this directive is delay as well as inefficiency, since requests must now go through an additional layer of review by headquarters employees, operating hundreds or even thousands of miles away from sites subject to information requests, with less knowledge of the facts underlying the requests than that of their regional counterparts.

Longer term, requiring centralized review of information requests leaves the process open to political influence from which EPA's compliance and enforcement activities have been rigorously shielded in the past. This policy has already led to fewer requests for information and slower enforcement actions, and the Pruitt EPA is underperforming previous administrations' collection of civil penalties from rule-violating polluters.

Via notice-and-comment, petitioning for reconsideration, and the right to petition the courts for review of rules, citizens have a fairly robust set of tools by which to hold the agency accountable

Another example of Pruitt's indifference, at best, to enforcement is his actions against the CAA's New Source Review program, which has played a crucial role in protecting local airsheds when firms expand their operations or build new facilities. Robust enforcement has been instrumental to the success of the program. Until recently, EPA worked to ensure that polluters estimate potential emissions increases accurately, since those estimates were the first step in applying the NSR program's pollution-control tools. Businesses have an incentive to underestimate the emissions impacts of new projects in order to reduce the amount of control equipment they will need to install. EPA has countered that incentive by scrutinizing those estimates and enforcing against inaccurate emissions projections. Courts have repeatedly upheld EPA's right to scrutinize industry estimates of air pollution increases.

In December 2017, however, Pruitt adopted what amounts to a non-enforcement policy: the agency now will accept firms' estimates, and not scrutinize the accuracy of emissions projections, or the performance of new projects. This policy surrenders to industry a position that EPA itself secured in a recent case in the Sixth Circuit upholding the agency's authority to double-check emissions estimates themselves.

Since Congress gradually assigned the agency its duties and responsibilities in the statutes it is required to implement, EPA has taken shape and evolved into an agency that must incorporate science to comply with its statutory obligations. It has also grown to rely on its regional offices in order to act in accordance with the cooperative federalism structure set forth in our environmental statutes and to have the information it needs to assure, and when necessary enforce, compliance. The Trump EPA, first under Scott Pruitt and now under Acting Administrator Andrew Wheeler, constrains its own capacities to take action in areas crucial to its mission and intended functions. In some areas, it even shifts toward becoming focused no longer on process but on results — anathema to any expert agency subject to the Administrative Procedure

Act's requirements, as interpreted by the courts.

Wheeler has shown early signs of changing course from Pruitt's way of doing things. Wheeler, for example, withdrew the No Action Assurance letter for the annual manufacturing cap on high-polluting "glider trucks," which Pruitt issued as his last day's act of defiance against a remaining Obama-era regulation. Although the withdrawal came after the D.C. Circuit had taken the unusual step of issuing a stay against the No Action Assurance — an indication of how inappropriate the NAA was in the first place — the withdrawal is an indication that Wheeler is willing to observe proper boundaries. This refinement in technique sets up an intriguing plot line going forward. On the one hand, a more faithfully followed rulemaking process is likely to compel Wheeler to account for data and analysis inimical to rolling back existing protections and remaining inactive in the face of new understandings of environmental threats. On the other is the administration's unswerving commitment to across-the-board deregulation.

Case in point: during the summer, the *New York Times* reported that Wheeler raised questions in internal deliberations about safety data the National Highway Traffic and Safety Administration used to support the proposed rollback of Corporate Average Fuel Economy standards, slowing down the issuance of the proposal. On the one hand, NHTSA and EPA did issue the proposal, along with rollbacks in tailpipe carbon dioxide emissions standards. On the other, Wheeler's intervention may have nudged the proposal toward a more honest accounting of the issues.

Faithfully followed, the rulemaking process is a stern taskmaster that demands intellectual honesty. Is it too much to hope that Wheeler will remain true to those dictates, even if they point to a path that leads him away from implacable deregulation? Wheeler-specific optimism aside, it remains the case that Pruitt's deconstruction agenda will remain one of his legacies. Despite his intent, however, Pruitt created a reverse blueprint for rebuilding EPA's dismantled capacities. His handiwork has also reminded us just how essential a properly functioning EPA is to public health and environmental protection. **TEF**

Is it too much to hope that Wheeler will remain true to the dictates of the rulemaking process, even if they point to a path that leads him away from implacable deregulation?

A Life of Quality

I started at EPA just after the Clean Water Act was passed and have helped to implement it at the federal and state levels ever since. Now retiring as executive director of the Rivanna Conservation Alliance in central Virginia, I have come to realize that government policymakers can learn a lot by studying solutions worked out at the watershed level

By Robbi Savage

After nearly three decades working on Capitol Hill representing the 50 states' chief clean water officials, I moved to a small country town to take over the administration of a local watershed conservation group — a position I now leave. Having worked at the federal, state, and corporate levels, it was an obvious next step — bringing my environmental career full circle. Or to use another metaphor, going from little fish in a big ocean to big fish in a little stream. But I came to the same perspective on water quality problems even though I was viewing many of the same issues with a different focus.

At the beginning, I was a very small fish. I joined the fledgling Environmental Protection Agency's water office just after the enactment of the Federal Water Pollution Control Amendments of 1972 — what everyone now calls the Clean Water Act. It was an exciting time to be at EPA in those early years; the agency's mission was clear, the leadership was seasoned, the employees were dedicated, and program funding was plentiful. I felt inspired by the sense of mission from Administrator William D. Ruckelshaus down to the lowly secretarial level, where I started my career. That wasn't uncommon for women of that era.

But just six years later, I was named executive director of the Association of State and Interstate Water Pollution Control Administrators, and as such became the principal representative in Washington of officials charged with implementing the CWA. In that position, I was invited to testify before Congress more than one hundred times on topics ranging from enforcement to funding, groundwater, nonpoint sources, pretreatment, stormwater, Total Maximum Daily Loads, and wetlands. I remember testifying three times on a single day on groundwater. And, during the debate on what became the CWA's 1987 amendments, I practically lived on the Hill. What a gift to work with the environmental greats, especially at a time when congressional Democrats and Republicans worked together for the good of the country.

The first floor debate I watched was on the meaning of "navigable waterways" and "waters of the United States," to this day an area of controversy. I was in the Senate Gallery watching Maine Democrat Edmund Muskie and New Mexico Republican Pete Domenici engage in an intense argument about ephemeral streams. I was struck by the respectful tone and empathy as Muskie, from a water rich state, and Domenici, from an arid state, each from a different party, were



Theresa White

trying to convince the other on what now seems to have been the beginning of the national debate on the geographic reach of the law. Nearly 30 years later I was there for the Supreme Court's oral arguments in *Rapanos v. United States*, which further defined navigable waters — or actually further muddied the waters.

A career-changing event at ASIWPCA was meeting with David Stockman, the former congressman and then the director of the Office of Management and Budget. Not long after Ronald Reagan's inauguration, Utah Governor Scott Matheson and I met in Stockman's office to discuss state funding priorities. Stockman announced that by the end of President Reagan's presidency the construction grants programs for clean water facilities would be no more. Stockman looked up at Matheson, who chaired the Water Committee of the National Governors' Association, and then at me to emphasize that we could let this happen or we could find a way through the political impasse. "Your choice," Stockman said.

It was less than 10 years since Congress provided \$5 billion in annual grant funding for the construction of wastewater treatment facilities — and now we were being told that President Reagan intended to kill this critical national program. In response, Matheson formed a working group of senior state officials to identify a series of options to protect, restructure, or remake the program. I was asked by the governor to organize and staff the meetings.

The 1981 Municipal Wastewater Treatment Construction Grants Amendments, passed at virtually the last moments of the session, made it clear that Stockman's threat was real and the process of eliminating the grants had begun. Congress reduced annual funding by more than half and limited eligible funding categories to only sewage plants and interceptor systems. Reserve capacity, to accommodate population growth, was completely eliminated — foolishly, in my view.

The death knell for the grant program would come with the 1987 amendments to the CWA, but the state and local government groups (having coordinated with EPA) were ready with legislative language for what became the State Revolving Loan Fund, still operating to this day. The proposed legislation was designed to

create a transition from federally funded grants to loans at favorable interest rates. The SRLF would phase in gradually by reducing grants and at the same time providing federal seed money for state-administered loans to local governments

In addition to sewage treatment, stormwater — rainwater runoff from industrial and municipal facilities — was also of concern during the 1980s because it had not specifically been addressed in the original legislation. The scope of the stormwater problem was huge, controls were difficult to implement, management systems were complex, and adequate funds were not available. For these reasons, stormwater controls were not being systematically permitted under the CWA's National Pollutant Discharge Elimination System. A number of citizen suits against EPA followed. These suits for not enforcing the act led to the crafting of legislative language for industrial stormwater dischargers and municipal separate storm sewer systems to obtain permits.

The sheer magnitude of the problem and the workload associated with issuing permits was a major concern for cities, counties, and other organizations. The National League of Cities and the National Association of Counties were particularly skeptical that Congress would provide funding to cover the costs of implementation. These concerns were prescient, because the grant program included in the initial amendment was deleted during the congressional conference committee as it considered the 1987 amendments.

In an unusual move, Senator John Chafee (R-RI) and Representative Bob Roe (D-NJ), committee chair and vice chair, invited me to serve as a technical resource to represent the states as the committee considered the State Revolving Loan Fund; the stormwater control and management program; Total Maximum Daily Load allocations; wetlands conservation; and new authorities for treating tribes as states for the purposes of the act.

During the proceedings and much to our surprise, EPA and ASIWPCA were asked to merge the House and Senate stormwater language. The acting assistant administrator for water, Rebecca Hanmer, and I convened a small group of attorneys to work through the night to create the stormwater language that is included in the 1987 amendments.

The conference committee came to agreement on a full reauthorization package, and it was sent back to the House and Senate for what was expected would be the last floor vote. On November 6, 1986, Congress unanimously approved the legislation and sent it to President Reagan for his signature. But President

"The death knell for the grant program would come with the 1987 Clean Water Act amendments, but state and local governments had an alternative ready"

Reagan decided not to act and the Congress was not in session — the result was a pocket veto, which cannot be overturned by a super majority.

In response, Senator George Mitchell (D-ME) convened a small group to develop a strategy to ensure that the vetoed bill would be the first action of the 100th Congress. The Water Quality Renewal Act was introduced as HR 1 and as Senate 1, which combined sailed through and was sent to the president. Once again he vetoed the bill, citing the cost of the new SRLF and governmental jurisdiction issues. On the latter, he meant the federal government should not pay for the remediation of nonpoint source pollution, stormwater management, and achievement of TMDLs of pollutants entering waterbodies.

On February 4, the Congress voted to override Reagan's veto, and the Water Quality Renewal Act of 1987 became law. Again I sat in the Senate Gallery, this time with Rebecca, to watch Congress pass the law. My vocal enthusiasm as the result was announced was met with the rap of the gavel and the admonishment, "Order in the chambers." But, as my mother used to say, "Robbi Jean, you are witnessing history in the making," so I signalled the important event with a loud shout.

Stormwater and TMDLs have followed me throughout my career. In 2006, I moved to Charlottesville, Virginia, to take over the reins of the Rivanna Conservation Society (now Alliance), a small citizens organization that promotes conservation in the watershed, a tributary of Chesapeake Bay. In that position, I participated in the technical advisory committees for the city of Charlottesville and surrounding Albemarle County. These groups helped design the local programs and the use of a stormwater utility.

Virginia's Department of Conservation and Recreation was initially responsible for the stormwater program, but the program was moved to the Virginia Department of Environmental Quality in 2013. This complicated the implementation of the stormwater program at the state and local levels because the commonwealth was requiring draft codes or ordinances for the program, with permitting authorities including the city, the county, and the University of Virginia. Based on the differences in population, community size, and age of the stormwater infrastructure, the program was being handled differently in each of the four primary jurisdictions within the Rivanna watershed, and because the initial legislative focus was on large stormwa-

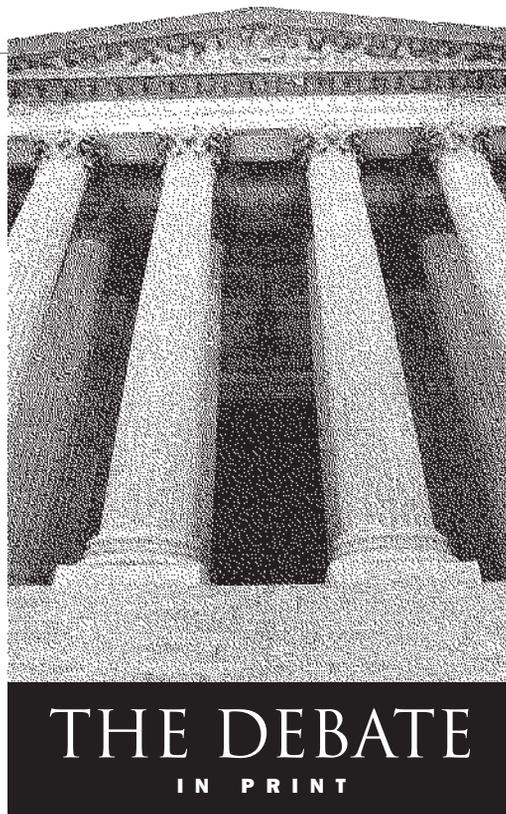
ter discharges, such as cities with over 350,000 population, the smaller discharges such as Charlottesville and Albemarle had several years to create their programs.

It should be obvious that I need to highlight the important role of nonprofit organizations in designing and implementing stormwater programs — and the CWA generally. We took advantage of the time provided to implement stormwater controls. RCA provided input on legislation, regulations, and policies, supported funding for development of best management practices, and served on local government advisory committees, meanwhile tracking the success and pace of local stormwater programs and educating the public. RCA along with the Southern Environmental Law Center and UVA's Conservation and Environmental Law Center engaged in a joint project to analyze and make recommendations for the improvement of the stormwater codes and ordinances. These recommendations were, for the most part, implemented by the localities.

At RCA, I led staff scientists who, with a team of dedicated volunteers, monitor 65 water-quality sites at the highest certified level for bacteria (*e coli*) and benthic macroinvertebrates (aquatic bugs). RCA is the only nonprofit to be certified at VA Level III, which means that government officials can, without follow-up, use RCA data to develop TMDLs for water-quality standards and also for related Section 305(b) reports to Congress. To monitor physical parameters, RCA has two River Stewards paddle the Rivanna weekly to monitor conditions, clean up trash, and help other paddlers as needed. We also conduct educational programs and workshops and regularly engage the community in World Water Monitoring Day, a program I created in 2002. That was the 30th anniversary of the Clean Water Act and the Year of Clean Water. Philip Cousteau's Earth Echo International now manages the monitoring program, which delights me.

After a career of 45 years, I have come to understand that the goals of legislation, regulations, and related policies can only be achieved with the involvement of all levels of government and the participation of interested and affected groups and individuals. I have seen this process at the federal level and the state level. Central Virginia and the Rivanna River watershed provide a microcosm of how this process can work at the local level. Federal, state, and regional officials are paying attention to the work of our alliance and similar watershed-protection groups around the country. **TEF**

"The Rivanna River watershed provides a microcosmic example of how governments and citizens can work together to achieve water-quality goals"



The Time for Abatement Alone Is Passing Us By — Should Humanity Consider Geoengineering?

Scientists have begun to hedge their bets and not count on society decarbonizing in time to avoid disruption to the Earth's climate system. Even if the dreams of the Paris Agreement are fully realized, the planet may become uncomfortably warm in the near term, bringing severe conditions. Consider current events.

Houston has been hit with two 500-year rainstorms this decade alone. The American West has turned into a tinderbox, with water running out and wildfires devastating populated areas every summer. Miami along with a lot of the rest of southern Florida is slowly slipping into the sea. Russian cargo ships are sailing from Vladivostok to Europe by way of an ice-free Arctic Ocean.

Enter a once-taboo topic shunned by greens and governments alike — geoengineering, a suite of technological remedies to solve the climate crisis or at least buy humanity more time to rid our energy and agricultural systems of greenhouse gas emissions. AT&T's Braden Allenby wrote about such intervention in these pages 18 years ago. In "Global Warning," he declared that international efforts at emissions abatement were doomed to failure and that "society should actively manage the entire carbon cycle, using a broad array of technologies and policies to achieve climate stabilization." What seemed like science fiction then has become today's unfortunate reality.

The proposals are as diverse as they are serious. One of the most-touted solutions is to reflect incoming solar radiation, perhaps by injecting sulfur particles into

the upper atmosphere. Or water droplets injected into clouds could make them more reflective. Another method would attempt to increase heat leaving the Earth by seeding the atmosphere with particles to thin high cirrus clouds that block energy outflow. Engineers have even suggested a huge mirror in solar orbit that would reflect a significant percentage of the sun's incoming heat.

Other possibilities revolve around removing greenhouse gases from the atmosphere, which can be accomplished through engineering techniques or even seeding the oceans with iron to cause algae blooms that sequester carbon on the seabed. More naturally, planting trees locks up carbon, and silicate rocks can be granulated to enhance their uptake of atmospheric carbon.

All well and good, but scientists are also aware that these techniques could play havoc with the planet's natural systems, disrupting flows of energy and elements that are vital to habitability. In addition, effects may perhaps worsen some conditions, and may be uneven, creating winners and losers. These unpredictable downside risks as well as climate-saving opportunities imply some sort of international body to manage geoengineering, but society has had some bad experiences in regulating technologies of much less consequence.

Is geoengineering necessary? What techniques will be the most successful while minimizing risks? And who will answer these questions and begin any needed interventions in the Earth's climate system?



“The world remains on track for more than 3°C of average warming by 2100. That will trigger calls for drastic measures to combat a climate emergency.”

Arunabha Ghosh

Chief Executive Officer
COUNCIL ON ENERGY, ENVIRONMENT
AND WATER



“It is probably too late for emissions cuts alone to limit risks. This reality provides context for all discussion of the contributions, costs, and risks of geoengineering.”

Edward A. (Ted) Parson

Faculty Co-Director
UCLA EMMETT INSTITUTE ON CLIMATE
CHANGE AND THE ENVIRONMENT



“Geoengineering will affect every country, hence all countries — and all sectors of society — need a say in how it is governed.”

Cynthia Scharf

Senior Strategy Director
C2G2/CARNEGIE CLIMATE
GEOENGINEERING GOVERNANCE
INITIATIVE



“Scientists will need to design solar radiation management strategies that will produce the desired mitigation with minimal side effects.”

Simone Tilmes

Project Scientist
NATIONAL CENTER FOR
ATMOSPHERIC RESEARCH

Transparency Needed for Public Trust Globally

By ARUNABHA GHOSH

The world remains on track for more than 3°C of average warming by 2100. That will trigger calls for drastic measures to combat a climate emergency, including carbon removal from the atmosphere or solar radiation management. Geoengineering urgently needs governance — and transparency lies at its heart.

Undeveloped or untested geoengineering technologies are likely to have impacts on rainfall, the hydrological cycle, tropical forests, the ozone layer, and the oceans. Uncertainties abound about the shock if solar geoengineering were deployed at scale and then stopped suddenly. The risk of unilateral action worries those unable to regulate independent scientists, or any country or alliances who choose to experiment or possibly deploy measures. Even if global average temperature were to be controlled, how could responsibility be assigned and liabilities imposed for adverse regional consequences?

There are also ethical concerns about intentions and legitimacy. By reducing incentives to mitigate emissions, geoengineering potentially creates a moral hazard. There is a related worry that investments in research could build momentum down a slippery slope toward deployment. Another concern is the difficulty in ascertaining intent behind geoengineering research or deployment. The ostensible reason could be a response to climate emergencies. But adversely impacted countries or regions would claim a legitimate right to verify if there were malafide intentions. The legitimacy of any experiment or deployment would rest on who has a say over how transborder impacts are assessed.

The long list of risks and uncertainties generates the demand for regulating geoengineering. Answering these concerns implies that research must continue. But effective outdoor research may require large-scale testing, bordering on deployment. Imposing a moratorium only on deployment while permitting research would be challenging to enforce. Thus, not just deployment but also research needs to fall within the ambit of governance.

Transparency must occupy a central role in geoengineering governance. But toward what end? Transparency is needed to minimize public risk. Impacts at a planetary scale need governance arrangements that are more risk-averse than for technologies that have limited physical impacts. In the absence of national or international regulation, a code of conduct for geoengineering research could serve as a stop-gap to control public risks, until more formal governance mechanisms are established. Information on research proposals, risk assessments, and disclosure of research results would be essential components of such a code.

Transparency is also needed to build public trust. This is critical to the sequential unfolding of research stages, from laboratory to field research to large experiments. Academic networks and peer-reviewed journals are insufficient to effectively communicate scientific findings to the public. Research registries might contribute to building trust but cannot replace political processes. National scientific assessments and public and parliamentary hearings would be necessary to effectively engage the public about geoengineering, within the broader context of climate responses.

In order to make transparency work for geoengineering, it has to be institutionalized, not ad hoc. A well-designed information system would perform three functions: disseminating information about national policies and research activities; promoting compliance with codes of conduct via peer pressure among research groups,

member countries, explicit sanctions, or pressure from non-state actors; and evaluating the impact of geoengineering research and experiments.

Self-reporting is the most efficient way to disseminate but carries the risk that some information might come too late for regulation. Eventually, there should be mandatory state-to-state disclosure, via a globally negotiated agreement, to empower countries to make informed choices. Moreover, legitimate public engagement requires a bidirectional flow of information between project proponents and stakeholders. It can be long, hard, and sometimes inconclusive, but would be a necessary step in enforcing compliance with codes of conduct.

For overall assessments of geoengineering activities, progressively inclusive governance could be pursued. It would begin with national assessments and national-level consultations to yield governance and transparency templates for different stages of research and experimentation. Thereafter, national policies on geoengineering could be reported to international forums. A combination of government and nongovernmental entities could coordinate for independent peer reviews and international consultations. Accordingly, international assessments of the progress and risks of geoengineering research could be conducted in select multilateral forums.

If these steps increase public trust and minimize risks, an international geoengineering research program could be envisaged, taking account of research capacities, funding, intellectual property, and rules for accountability and liability. Without transparency, there will be more contestation. With transparency, conditions of distrust could be marginally abated.

Arunabha Ghosh is CEO of the Council on Energy, Environment and Water, in Delhi. Last May, he deposed before UN Environment's Committee of Permanent Representatives on the governance of geoengineering.

Assess Proposals in the Context of Climate Risks

By EDWARD A. PARSON

The risks climate change poses to human societies and ecosystems are severe. Yet pursuit of cuts in global greenhouse gas emissions has stalled for so long that it is probably too late for emissions cuts alone to limit risks to acceptable levels. This stark reality provides essential context for all discussion of the potential contributions, costs, and risks of geoengineering.

Human activities have already heated the Earth by 1°C, bringing impacts whose severity grows clearer each year. The 2015 Paris Agreement adopted targets to limit heating to 1.5 to 2°C, but current policies and actions are far too weak to achieve these. Absent much stronger action, the Earth is headed for 2.5 to 5°C heating this century, bringing likely disruption to lives, livelihoods, and ecosystems at a scale human societies have never experienced.

Stopping climate change requires cutting emissions to zero. Stopping it near the Paris targets requires cutting to zero within a few decades. This means going from today's 80 percent reliance on fossil energy to a fully decarbonized economy, plus profound changes to eliminate emissions from agriculture, forestry, and other land-use, and multiple industrial processes.

Some models say 2°C is still technically feasible, but only with multiple favorable assumptions, including rapid emission cuts starting immediately, low global energy demand, and fortunate outcomes on major scientific uncertainties. This doesn't mean deep emissions cuts aren't essential, or that they can't reduce coming climate change risks: they are, and they can. But today's efforts are probably fighting to reduce heating of as much as

5°C to maybe 2.5°C, still more than the Paris goals.

If this situation is unacceptably dangerous but emissions cuts can't do much better, what can be done? This question is the reason to discuss geoengineering. It might be able to substantially reduce climate risks. It also presents new risks and challenges, including potentially serious problems of governance. Whether these problems are manageable or severe, they must be considered in the context of the risks of climate change.

The two main geoengineering approaches have different profiles of benefits and risks. One approach removes CO₂ from the atmosphere and puts it in some stable reservoir. Proposed methods range from large expansion of familiar forest or soil-conservation practices, to novel chemical methods of direct air capture. Specific methods differ in state of development, potential scale and limits, and environmental and socioeconomic impacts, but have two things in common. First, they act slowly: sucking CO₂ out of the atmosphere is draining a swimming pool through a straw. Second, if done at large enough scale they can make net emissions negative and thus reduce atmospheric CO₂, not just slow its increase, and so run climate change backwards.

The second approach, solar geoengineering, would reflect away a little incoming sunlight to change the Earth's energy balance. Promising methods include spraying reflective mist in the upper atmosphere, and making low-level ocean clouds denser and whiter. Unlike carbon removal, this approach does not target the cause of climate change, but instead makes an offsetting change. It is thus an imperfect, incomplete correction for greenhouse-driven climate change, but it has the unique advantage that it can be started, controlled, or stopped over time periods of a year or less. It would also bring its own impacts and risks. Early research suggests the most obvious impacts are surprisingly moderate

and potentially correctable, but this is far from a clean bill of health.

Neither approach can replace efforts to cut emissions and adapt to coming climate changes. These both remain essential. But both approaches can complement these to further reduce climate risks. Both need research to characterize how and how well they could work, what risks they would carry, and how these could be mitigated. Both also need serious consideration of how to develop needed capacity for governance, able to make competent, prudent, and legitimate decisions on whether and how they are used, to manage associated impacts and conflicts, and to integrate them into an effective overall climate strategy.

Neither approach is getting the serious investigation and critical scrutiny it needs, but in nearly opposite ways. Assumptions of enormous future carbon removals have quietly become a mainstay of climate planning, heavily relied on in nearly all 1.5 and 2°C scenarios, with little examination of feasibility, limits, or impacts. Solar geoengineering has been marginalized in climate assessments and policy debates, based on presumptions of severe harm or impairment of climate policy that have also received inadequate research or critical scrutiny.

This has to change. To bet the future on carbon removal working at the required billion-ton scale with acceptable impacts is a reckless gamble. To exclude solar geoengineering from consideration based on untested intuitions that it would be a cure worse than the disease is equally reckless. For all their challenges, these approaches may make things less bad than they otherwise will be, for human society, for vulnerable people and communities, and for ecosystems.

Edward A. (Ted) Parson is Dan and Rae Emmett Professor of Environmental Law and faculty codirector of the Emmett Institute on Climate Change and the Environment at the University of California, Los Angeles.

It's Smart Risk Management and a Political Investment

By CYNTHIA SCHARF

When I speak to audiences about geoengineering, I often start by saying I wish my job never existed. There would be no need to inform and encourage governments to create international guardrails around emerging climate technologies because decades ago my generation had taken care of job number one: radical, immediate decarbonization and strengthened adaptation.

Alas, that's not the world we live in. Even at current levels of warming, climate change impacts are devastating, as we saw last summer, especially for those who did least to contribute to the problem but suffer first and worst from its effects. The longer the anemic global response to the climate crisis, the greater the pressure to deploy large-scale carbon removal, and potentially even solar geoengineering, to reduce dangerous climate impacts.

These technologies could potentially provide significant, if unequal, benefits if governed in an inclusive, just, and transparent manner. But they also pose critical environmental and geopolitical risks — known and unknown. Geoengineering will affect every country, hence all countries — and all sectors of society — need a say in how it is governed.

In speaking with governments and civil society organizations, it is abundantly clear we do not know enough about the risks, costs, and potential benefits of these technologies. Nor are we doing near enough to address how we might govern them in an equitable, accountable manner.

Several international agreements have potential relevance for geoengineering, but at present there is no systematic set of international frameworks. This needs to change — now.

We need a society-wide discussion about how to govern these technologies, before events overtake our ability to respond in an informed way. Indeed, this could be one of the most important conversations any government and civil society leader has in coming years.

To do so is not to abdicate responsibility for reducing emissions. Rather, it's smart risk management and a wise political investment in a safer world.

Effective governance should be grounded in the precautionary principle and be inclusive, transparent, and equitable. It also should be developed in parallel with research, so the latter informs the former. Large-scale carbon removal and solar geoengineering will require multilateral governance, as both entail transboundary risks and challenges and could affect all countries, if unequally, creating global winners and losers.

Current UN bodies, primarily the climate convention, are appropriate for governing carbon removal at the multilateral level. National and sub-national governance also will play a key role. Solar geoengineering, however, poses thornier challenges. No existing institution covers the full range of issues that might arise. A polycentric approach will be needed, since the world evidences no appetite for creating new multinational institutions in the current political atmosphere. Existing institutions could include the UN Environment Assembly, the Convention on Biological Diversity, the General Assembly, and regional bodies.

The Intergovernmental Panel on Climate Change's recent report makes clear that the world will need tremendous amounts of carbon removal in coming decades to avoid runaway climate change. Are existing climate convention mechanisms, including Paris, sufficient to address the full range of issues that may arise? These include land use, storage, liability, and compensation as well as responsibility, monitoring and reporting, and impacts on the Sustainable Development Goals. Eq-

uity and political responsibility are also key. Governments will need to cooperate on technology, funding, and the policy and market mechanisms that can make those technologies that have a social license to operate viable.

Even with a massive ramp up, it may not be possible to remove enough carbon in time to keep global temperatures from breaching danger points. Some countries might then consider solar geoengineering. At best, it might buy the world some time.

But who would be making the decisions to use this powerful technology? Whose hand will set the global thermostat? Under whose authority and with what political legitimacy? How, when, and under what circumstances? Political, as well as profound ethical and moral issues, are in play.

The world needs rules of the road to stop anyone — a government or even a non-state actor — from testing and deploying solar geoengineering unless the risks and potential benefits are sufficiently understood, and international governance frameworks are agreed and in place. Absent this, the world would be faced with environmental and geopolitical risks that could affect current and all future generations.

The era of risk-free options is past. Three years after Paris, there is a grave risk in assuming that our present tools — emission cuts and removals of small amounts of carbon dioxide — may be enough. It is critical that society as a whole wake up and weigh in on how geoengineering should be governed. The voices of the poor and marginalized, as well as faith communities, are essential to this discussion.

Governments need to learn more about geoengineering and put it on their shortlist of priorities. It is up to them to create the international guardrails that can help the world stay safer in a climate-chaotic future. The stakes could not be higher.

Cynthia Scharf is senior strategy director, C2G2/Carnegie Climate Geoengineering Governance Initiative.

Solar Control As Part of Mitigation Portfolio

By SIMONE TILMES

Delayed actions to reduce greenhouse gas emissions will have irreversible effects on the planet's ecosystem and on society. Some of these changes have already become apparent, including dying coral reefs, melting glaciers, and sea-level rise. Even with the most ambitious emission abatement efforts, permanent changes to the climate system are very likely unavoidable.

Enter geoengineering technologies, which could provide an opportunity to prevent temperatures from reaching critical limits. But besides developing a framework that governs geoengineering research and potential applications, we need a robust understanding of the benefits as well as the limitations and risks of different geoengineering proposals.

Two that are getting the most attention of late are carbon dioxide removal from the atmosphere and solar radiation management. While the development of CDR technologies has gained support in recent years, relatively little work has been done to explore SRM options which, moreover, lack significant R&D funding. In particular, there seems to be a misconception that SRM research would distract from emissions-abatement efforts. Further, unlike CDR, it may pose too many risks — a conclusion which ironically is a consequence of the limited understanding and development of these technologies.

If society instead decides to explore SRM options, decisionmakers can make better judgments as to whether they should become an important element of the global miti-

gation portfolio. Indeed, SRM may provide an opportunity in the future to reduce some of the suffering in case abatement efforts and CDR will not be sufficient.

The full effect of global SRM applications can only be tested using comprehensive Earth-system models. Such testing demonstrates that global solar reduction through enhancing of stratospheric aerosols is the most effective geoengineering approach to reach global temperature targets. However, since this application changes the Earth's energy balance, it will not result in the restoration of past climate conditions and could in fact produce unfortunate regional climate shifts and other side effects.

So far, scientists have mostly explored the effects of global SRM using idealized modeling experiments. These often do not result in realistic outcomes in terms of impacts and side effects but have been an important first step in increasing the scientific understanding of physical changes to the atmosphere. More recent modeling has demonstrated that some side effects from earlier experiments can be reduced by applying newly derived strategies.

Continued research in this direction is promising and could provide a more robust understanding of benefits and impacts. For this, Earth-system scientists and engineers need to work with ecologists, social scientists, and economists to optimize strategies that would help society determine whether these technologies should be considered. International engagement rather than work performed by single actors would likely produce the best results.

The amount and timing of potentially implementing SRM are still unknown and presumably dependent on assumptions about future emissions of greenhouse gases. Ideally, limited SRM could be temporarily phased in and phased out to reduce a projected peak in global

warming in order to prevent irreversible climate changes from happening until emissions abatement and CDR efforts have taken effect. However, since SRM would then be masking the warming from greenhouse gases still in the atmosphere, it may create a false sense of security and thereby promote the continued use of fossil fuels. A continued rise of greenhouse gases in the atmosphere would result in a prolonging of the application, with more risks and side effects.

In particular, potential interruptions of very large SRM applications would force temperatures to bounce back up at dangerously fast rates. Additional risks of SRM applications could arise from feedback in the climate system that triggers unexpected reactions, requiring much larger or smaller applications than expected.

The conclusion is clear. Society needs to work hard at continually improving climate models as well as gathering observational data to increase confidence in projections and to reduce the risks of the unknowns of inaction countered against the unknowns — and knowns — of geoengineering strategies. Potentially safe and effective amounts of SRM under different future climate scenarios have yet to be developed.

Global solar geoengineering approaches may become an important addition to other efforts to help reduce future climate impacts. Scientists will need to design SRM strategies that will produce the desired mitigation with minimal side effects — and with international approval. However, only binding international targets to ensure the rapid and complete phase-out of greenhouse gas emissions is needed to prevent long-term dependency on geoengineering and artificial interference with the climate system.

Simone Tilmes is a project scientist at the National Center for Atmospheric Research.

MOVERS & SHAKERS

Movers

Brittany Bolen will permanently lead EPA's policy office after serving as acting policy chief since April.

Veteran Hill aide **John Bowman** has joined the Natural Resources Defense Council as senior director for federal affairs. He was most recently the American



Association for Justice's federal relations director.

Byron Brown has left as EPA's deputy chief of staff for policy and joins the practice of Crowell & Moring LLP in its DC office.



The Center for Land, Environment, and Natural Resources at the University of California-Irvine School of Law has chosen **Wil Burns** as its new director.



Mike Catanzaro, a former special assistant to President Trump, now chairs the Energy Consumer Market Alignment Project, which focuses on reducing the energy sector's regulatory barriers.



The American Forests' board of directors has named **Jad Daley** as the next president and CEO of the conservation organization.



Abigail Dillen takes the helm of Earthjustice as its president. Dillen previously led the organization's

climate and energy litigation program.

The Nuclear Regulatory Commission has tapped general counsel **Margaret Doane** to serve as executive director for operations. Doane takes



over the position from **Victor McCree**, who is retiring from the panel after 30 years.

Kellie Donnelly, deputy chief counsel of the Senate Energy and Natural Resources Committee, succeeds **Patrick McCormick** as chief counsel.

The White House has nominated **Alexandra Dapolito Dunn** to lead EPA's Office of Chemical Safety and Pollution Prevention.

Amanda Eversole has left JPMorgan Chase & Co. to lead the American Petroleum Institute's strategic planning efforts for natural gas and oil.

The Chesapeake Bay Foundation has landed **Lisa Feldt** as its vice president for environmental protection and



restoration. Feldt was previously director of the Department of Environmental Protection in Maryland's Montgomery County.

Ephraim Froehlich is now Alaska Governor Bill Walker's senior advisor on fish and games and deputy director for state and federal relations. He previously worked for Senator Lisa Murkowski.



Former Obama-era EPA policy chief **Michael Goo** of consulting group AJW Inc. has been hired to lobby for the Natural Resources Defense Council.

Van Ness Feldman has acquired five partners, expanding its environmental litigation and transactional practices: **Michael Goodstein, Anne Lynch, Andrew Cooper, Brian Zagon,** and **Allison McAdam**, all formerly with Hunsucker Goodstein PC.

Sriram Gopal has been promoted to director of technology & environmental policy at the Association of Home Appliance Manufacturers, up from his role as a policy analyst at the association.

Bob Haus leaves the Department of Energy's Office of Public Affairs to return to his home in Iowa to take on a government relations job with Corteva Agriscience.



Jennifer Haverkamp, formerly a negotiator for the State Department, will take the reins of the University of Michigan's Graham Sustainability Institute.



Shannon & Wilson's environmental group welcomes **Schylar Healy** as an environmental scientist in its Anchorage office.

James Hubbard was approved by the Senate as undersecretary for natural resources and environment at the U.S. Department of Agriculture.

The American Wind Energy Association announces **Jennifer Jenkins** will lead its efforts to expand the U.S. market for distributed power from wind energy.



The American Petroleum Institute has hired **Gao Jie** as a chief representative for its Global Industry Services division.

Toxicologist **James Kim** has been hired as the associate vice president of science and regulatory affairs at the American Cleaning Institute. He leaves the White House's Office of Information and Regulatory Affairs.

Dan Lashof leaves behind his role as chief operating officer at the NextGen Policy Center to be director of the U.S. operations of the World Resources Institute.



David C. Lew will take the lead as administrator of the Nuclear Regulatory Commission's Region 1. Lew previously served as deputy regional administrator.

MOVERS & SHAKERS

Shakers

Ya-Wei Li is now director for biodiversity at the Environmental Policy Innovation Center after serving as a leading conservation advocate with the Defenders of Wildlife for eight years.

Former ELI Research Associate **Sarah McKinstry-Wu** joins the Urban Sustainability Directors Network, where she will be a strategic projects manager.

Pat McCormick has left Capitol Hill, where he was chief Counsel for the Senate Committee on Energy and Natural Resources.



He joins the fuel cell firm Bloom Energy Corp. as vice president of regulatory affairs.

The Environmental Defense Fund has selected as senior vice president of its oceans



programs **Katie McGinty**, who served as secretary of Pennsylvania's

Department of Environmental Protection and head of the White House Council on Environmental Quality.

Leader and founder of the Southern Environmental Law Center **Rick Middleton**, has retired after 33 years at the organization.



Deputy Director **Jeff Gleason** takes over the role.

Vaughn Noga joins EPA's Office of Environmental Information as the principal deputy assistant administrator.

Meaghan Parker is the Society of Environmental Journalists' new executive director. She leaves behind her role as the partnerships director and senior writer/editor for the Environmental Change and Security Program at the Woodrow Wilson Center.



Covington & Burling LLP has grown its Energy Industry Group: **Kevin Polonczak** has joined the firm's San Francisco office.

The board of the National Association of Water Companies has selected **Robert F. Powelson**, formerly the federal energy regulatory commissioner, to serve as the organization's chief executive.

Michelle Roos has been chosen to serve as the first full-time executive director of the Environmental Protection Network. EPN is a group of EPA alumni and



others working to preserve bipartisan progress towards cleaner air, water, and land.

Jayne Roth will be senior vice president for global policy and government relations at Conservation International. He previously headed government affairs for Starbucks.

Beth Rothenberg transitions from McGuire Woods to Holland & Knight's Jacksonville office as partner.

Vermont Law School has tapped **Jennifer Rushlow** to lead its Environmental Law Center. Rushlow comes to academia from the Conservation Law Foundation.



John Scanlon, who previously served as secretary-general of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, joins the conservation nonprofit African Parks as a special envoy.

Mike Sommers, a staffer for former House Speaker John Boehner, becomes president and CEO of the American Petroleum Institute, as **Jack Gerard** steps away from the role.

Michael Tadeo leaves his position as spokesman for the American Petroleum Institute to join the Department of Energy's Office of Fossil Energy as senior advisor.

Hana V. Vizcarra has joined Harvard Law School's Environmental & Energy Law Program. She comes to academia from private practice, most recently with Beveridge & Diamond, P.C.

Andy Wink has joined the Bristol Bay Regional Seafood Development Association as executive director.

Jamie Bechtel has been appointed to SenesTech's Board of Directors. Bechtel is co-founder and a board member of New Course and a leader in international conservation.

ELI Visiting Scholar **Michael Curley** has been chosen to provide environmental commentary each month for Maryland national public radio station WYPR.

Former ELI senior attorney **Jordan Diamond** has been



appointed to the California Ocean Protection Council by Governor Jerry Brown.

She is executive director at the Center for Law, Energy, and the Environment at UC-Berkeley.

Russ Mittermeier, chief conservation officer for Global Wildlife Conservation, won the Indianapolis Prize, presented by the Indianapolis Zoological Society for the successful conservation of endangered or threatened species.



Hollard & Knight attorney **Letitia Moore** was awarded EPA's



Distinguished Career Service Award. Moore recently joined the firm from EPA, and this award recognizes her service throughout her employment in EPA since 1989.

ELI REPORT

Making Law Work for People, Places, and the Planet

Judicial Education Fighting Indonesian deforestation through new civil society mechanisms designed to protect resources

ELI and the Indonesian Center for Environmental Law have been diligently carrying out a training project in the archipelago to help judges become a player in the fight against deforestation and the path toward sustainable development.

Indonesia is home to incredible biodiversity. The country covers only 1.3 percent of the planet's surface but it is home to 4 percent of the world's most ecologically undisturbed forests. Indonesia also possesses about 50 percent of the world's tropical peatlands, which serve as an important carbon sink.

However, these natural resources are increasingly under threat from the pressures of a growing population and expanding, often unlawful economic activity that together are diminishing Indonesia's rich biodiversity, threatening the health and livelihoods of communities that depend on natural resources, and releasing enormous amounts of carbon into the atmosphere.

To address these issues, there is a promising new legal tool in Indonesia enabling civil society organizations and the government to file claims to hold responsible parties liable for environmental damages.

However, many judges lacked the knowledge and capacity to ensure this authority was effectively applied.

In response to requests from the Supreme Court's Working Group for Judicial Certification on the Environment for support in its efforts to certify judges to rule on environmental issues, ELI's Judicial Program and its collaborators developed

The workshop emphasized the role the environment plays in human well-being and economic prosperity, as well as limitations to ecosystem resilience in the face of degradation. Sessions addressed topics such as principles of environmental science, valuation of natural resources in the context of compensation and restoration, scientific evidence and

By transferring critical knowledge to the judiciary to understand and address liability for environmental damages, this project will improve environmental quality in Indonesia by promoting environmental accountability through judicial enforcement. Ultimately, the benefits will include reduced deforestation and greenhouse gas emissions and improved biodiversity and quality of life, especially for vulnerable communities.

The curriculum draws on the local expertise of partners at ICEL. Judge Merideth Wright, a Distinguished Judicial Scholar with ELI and a former environmental judge for the state of Vermont, and Judge Anders Bengtsson of the Växjö Land and Environment Court in Sweden are contributing their experience as members of the judiciary.

ELI Visiting Scholar Carol Jones lent her expertise on the economics of valuing damage to the environment and Alejandra Rabasa, director of ELI's Judicial Program, discussed scientific evidence and uncertainty.

This project is generously supported by the Swedish Postcode Foundation, an organization dedicated to seeking long-term solutions to local and global challenges.



Local panelists discuss how to improve the capacity of judges to adjudicate cases regarding environmental liability.

a **capacity-building curriculum to train the country's judiciary** to be a critical part of the efforts to improve environmental quality. ELI and the project team launched this curriculum in Pekanbaru, Indonesia, this summer.

ELI and partners convened a five-day workshop that brought together 38 judges from different regions of the country as well as three Supreme Court justices to discuss economic valuation, restoration, and compensation of environmental damages.

uncertainty in the courts, standards of liability, and mechanisms for ensuring that judicial decisions are carried out.

The participants also had the opportunity to attend a field trip to a peat ecosystem affected by fires, providing the judges with a unique opportunity to observe the complex dynamics of damage and degradation to ecosystem services and to conduct experiments illustrating the challenge in collecting scientific evidence in these cases.

Report helps trustees in natural resource damage process

Eight years after the Deepwater Horizon oil spill, restoration activities in the region remain ongoing. ELI's gulf team has focused recent efforts on helping project trustees strategically coordinate their activities to make the most of time and material and financial resources.

In March the team released a paper that surveyed some of the tools available to Deepwater Horizon natural resource damage assessment trustees to help coordinate their activities.

As a follow up to this work, the Institute recently released **Coordination in the Natural Resource Damage Assessment Process: Project Planning and Selection**. Building on previous re-

search, this guide describes some additional tools that are available during project planning and selection that could help coordinate the trustees' activities internally within the NRDA program (namely, among the Trustee Implementation Groups) as well as with other entities. This paper focuses on project screening criteria, strategic frameworks, and joint restoration.

When selecting projects for their restoration plans, the TIGs use a systematic screening process. The TIGs could

develop additional project screening criteria that will promote coordination with external entities, other TIGs, or both. Examples could include encouraging or favoring projects that leverage funds from outside sources,

are consistent with existing plans or efforts, or leverage activities of other TIGs or external entities.

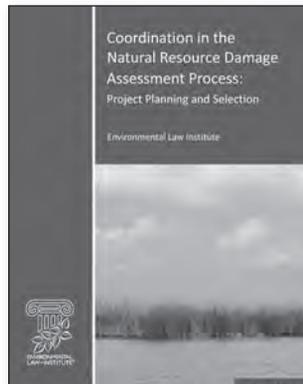
Strategic frameworks are another tool available during project planning and selection to help coordinate activities.

In 2017, the region-wide TIG released four strategic

frameworks — one each for birds, marine mammals, oysters, and sea turtles. Frameworks such as these provide a useful starting point. They ensure that trustees and others have the same information about the resource.

There may be additional information the frameworks could provide to support coordination. For example, they could identify specific activities and mechanisms that support coordination.

Another tool that may be useful in helping the TIGs coordinate internally during project planning and selection is joint restoration planning. This type of planning could be an effective way for TIGs to coordinate across restoration areas.



Extra! ELI BREAKING NEWS webinars bring the latest developments

In response to demand for unbiased analysis, the Institute has been at the forefront of educating members and the public on impending changes in state and federal government policies and judicial action through **BREAKING NEWS webinars**, allowing the Institute to provide answers on the most recent relevant topics affecting environmental law in a timely fashion.

The first **BREAKING NEWS** webinar reflected on Justice Anthony Kennedy's retirement from the Supreme Court. For the past three decades, Kennedy had been a crucial swing vote on a variety of issues including the environment. His retirement came at an especially crucial time, as the Supreme Court's

2019 docket includes cases that cover a litany of environmental issues. Attracting over 350 viewers, the webinar featured expert panelists exploring the influence Kennedy had on environmental law, and what his departure from the court could mean for the future.

The second **BREAKING NEWS** webinar discussed comprehensive changes proposed by the Department of the Interior and National Oceanic and Atmospheric Administration in how the Endangered Species Act is implemented.

These regulations and policies address the species listing process, including the definition of "foreseeable future," critical habitat designations, and the Section 7

process that directs all federal agencies to consult with the Fish and Wildlife Service when any agency action might affect an endangered or threatened species.

This panel provided an advanced look into potential benefits and repercussions of utilizing the ESA under this regulatory proposal. Each panelist highlighted his or her areas of interest in the proposals and described improvements that could be made in the process to finalize the regulations. The webinar allowed participants to learn about the proposed changes as they were opened to public comment.

ELI's most recent webinar focused on the Waters of the United States regulatory de-

terminations and the ramifications and implications of district court Judge Norton's August decision to enjoin EPA's suspension rule. His decision re-instated WOTUS as the applicable legal standard in 26 states not already subject to two prior district court injunctions staying WOTUS. Panelists from law firms, environmental groups, and industry discussed what this change means for the future of the Clean Water Act.

Believing in rational, nonpartisan discussion, ELI provides a perfect venue to explore these major changes in environmental governance. The Institute will continue to provide education on the most pressing and time-sensitive environmental issues.

Field Notes: Helping nation protect sensitive marine areas



EDUCATING CHINESE JUDGES — ELI Attorney Zhuoshi Liu (third from right) hosted judges during their stay for a global symposium at the Organization of American States in Washington, D.C.

At the 2017 Our Ocean Conference, Niue's minister for natural resources, Dalton Tagelagi, announced that the South Pacific Island nation would create a marine protected area covering 40 percent of Niue's Exclusive Economic Zone to conserve the unique marine diversity in national waters. The MPA will include the waters of the remote Beveridge Reef, a place of rich marine biodiversity.

ELI is helping the Niue government identify and conduct legal reforms to put this MPA into effect. After preliminary analysis by ELI, Ocean Program Director Xiao Recio-Blanco conducted a **research trip to Niue** to gather information on how to effectively enact the MPA within the nation's legal framework, with a special focus on fisheries management. With the creation of the MPA, Niue hopes to promote itself as a prime global marine ecotourism destination.

In August, the Institute co-organized a global symposium on **The Judiciary and the**

Environment: Adjudicating Our Future. The conference took place at the Organization of American States, which co-organized the event along with the Global Judicial Institute on the Environment, and the World Commission on Environmental Law of the International Union for the Conservation of Nature.

Over two days, presidents of supreme courts and judges from around the world, as well as renowned experts, convened to discuss the challenges facing the judiciary in implementation and enforce-



Pictured are the organizers and presenters of "Judiciary and the Environment: Adjudicating Our Future."

ment of environmental law.

ELI President Scott Fulton, who served on the symposium organizing committee, was present to provide welcoming remarks on behalf of the Institute. ELI Vice President of Programs and Publications John Pendergrass co-chaired a session on emerging principles and trends

in environmental rule of law. ELI board member Nicholas Robinson and ELI Leadership Council Member Michael Gerrard were also present at the symposium as session co-chairs.

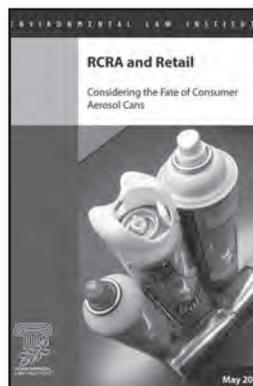
In devising new approaches for the management of wastes under the Resource Conservation and Recovery Act, federal regulators can draw on their years of experience working with particular sectors and materials. In the retail sector, managing

discarded and returned consumer aerosol cans can often require their management as hazardous waste. This waste stream also accounts for nearly half of the RCRA-regulated material in the retail sector, driving the status of stores as large-quantity generators.

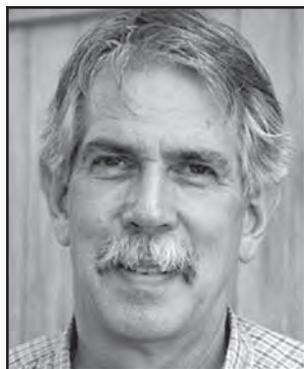
On the other hand, these same cans,

when disposed of by consumers in their homes, are treated as household waste and can be managed or recycled in other ways, including ways that involve substantial steel and aluminum recovery from municipal waste management. ELI released a research report exploring this incongruity. **RCRA and Retail: Considering the Fate of Consumer Aerosol Cans** examines the regulation of the retail sector, the fate and recovery of materials from aerosol cans, and opportunities for further action.

Showcasing ELI's coast-to-coast reach, the Institute collaborated with Hunton Andrews Kurth's San Francisco office to hold a summer series featuring **key representatives from the region's environmental regulatory agencies.** The series of seminars provided attendees with the opportunity to interact with environmental regulators and professionals in the field on the latest issues and challenges.



ELI Research report "RCRA and Retail."



ELI in Action

Tech Opportunities for Some Tough Problems

David Rejeski

Director, Technology, Innovation and the Environment Project

Everyone seems to have an opinion about what technologies matter. The physicist Steven Hawking declared that the 21st century will be the “century of biology.” Historian Yuval Noah Harari has spent a decade warning us of the dangers of artificial intelligence and biotech. Maybe it is the convergence of technologies, the collision of info, bio, and nanotech with cognitive science or, as some call it: the big BANG — bits, atoms, neurons, and genes.

This concern underpins a study ELI completed for the Scientific and Technical Advisory Panel of the UN’s Global Environment Facility to explore so-called novel entities — “things created and introduced into the environment by human beings that could have disruptive effects on the earth system.”

For purposes of the study, we expanded the definition beyond “entities” to include “the production processes that create the entities.” The project’s goal was to create a portfolio of novel entities and associated strategies that can be integrated into the next GEF strategic plan, providing guidance for investments over the next five years and beyond.

ELI used a number of approaches to identify and priori-

tize novel entities of potential interest, including a two-round global Delphi survey, over two dozen interviews with experts, an extensive literature search, and an expert workshop. We narrowed down over 20 potential technologies to a core group of seven, based on assessments of their timing, impact, and relevance to GEF programs, in biodiversity, climate change, chemicals and waste, international waters, land, forests, and cross-cutting issues of food security, sustainable cities, and fisheries.

Our exercise highlighted the need for the GEF to focus efforts on improving the environmental performance of existing production systems, shaping emerging process technologies such as bioengineering to maximize environmental benefits and minimize risks, and paying more attention to enabling technologies, such as gene editing, which could drive significant systemic changes across multiple GEF programs.

The final portfolio includes seven areas classified in terms of temporal importance and their implications for the GEF. The shorter time horizon includes technology-critical components, such as rare earth elements, next-generation nanotechnologies, gene

editing, and blockchains. The longer time horizon group includes engineered bio-based materials, nano-enabled energy, and cellular agriculture.

Rare earth elements are of particular importance, given their critical role in the production of wind turbines and electric vehicles. Demand for these materials is growing at 15 percent per year, with most of the production located in China. Because these elements are closely embedded with other product components, their separation for recycling is difficult. Hence, they tend to flow linearly through the global economy, ending up in landfills, with less than 1 percent recycled or reclaimed.

The existing production systems provide opportunities for circular-economy strategies, such as recovery and recycling, building products to last, product upgrading, take-back schemes, or product-as-a-service, capable of addressing the linear extraction, use, and waste cycles.

ELI concludes that the management of complex supply chains for items like wind turbines or natural resources like timber or agricultural products would benefit from blockchain technologies that can create more transparency and reduce transaction costs

in areas such as inbound-outbound logistics, inventory management, distribution, and recycling, recovery, and reuse.

We also flagged for the GEF other blockchain applications enabling peer-to-peer energy systems (or micro-grids), establishing land tenure or benefit-sharing of genetic resources, improving waste management, and providing financial services for the 2 billion people on the planet who are unbanked.

Finally, ELI notes that recent advances in synthetic biology, along with the development of gene editing techniques, have dramatically expanded the range of products that can be engineered from organic materials through the programming of metabolic processes in biological organisms such as yeast. Such advances could enable a shift from a hydrocarbon to a carbohydrate economy and reduce environmental impacts across several GEF work areas — climate change, land degradation, biodiversity, international waters, forestry, and chemicals and waste.

The Institute’s Technology, Innovation and the Environment program has started a project called **Bending the Curve** to explore some of the technologies highlighted in the GEF report that could have planetary impacts if scaled successfully. These include bio-engineering approaches to reducing the energy needed for cement production, allowing plants to fix their own nitrogen, and developing ways to produce protein for human consumption without the impacts of livestock.

Closing Statement

Independent Oversight
and the Rule of Law

There has been a good deal of focus of late on the role of independent oversight in the administration of government operations. Sometimes oversight mechanisms are created in an ad hoc manner in response to particular issues, as with the appointment of an independent counsel. More often it proceeds under the established system of checks built into law to help ensure transparent, effective, and ethical effectuation of government authorities and duties.

The offices of inspector general that are attached to, but independent from, the various departments and agencies of the federal government serve as one key element of that architecture, along with the Standards of Conduct for Executive Branch Employees developed by the Office of Government Ethics that provide a consistent baseline of expectation, and a yardstick against which the IG community does its work. There is, I believe, consensus support for these mechanisms, and their state law counterparts, as vehicles for preventing or redressing fraud, waste, and abuse in government programs, but I thought I might reflect a bit on the importance of independent oversight in formation of rule of law.

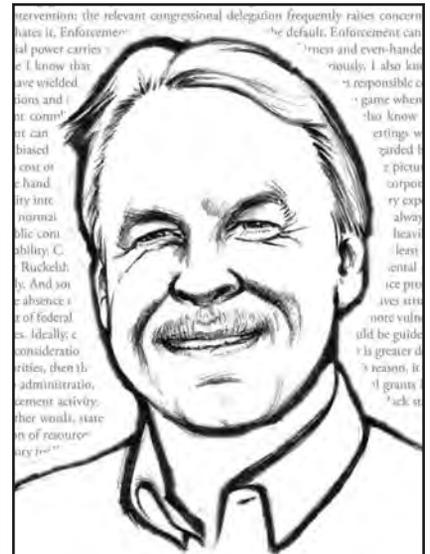
Rule of law has been defined within the United Nations system as the “principle of governance in which all persons, institutions and entities, public and private, including the state itself, are accountable to laws that are publicly promulgated, equally enforced and independently adjudicated, and which are consistent with international human rights norms and standards.”

This definition contains three related strands: the idea that law be consistent with fundamental rights; the notion that law be inclusively developed and fairly effectuated; and the importance of accountability not just on paper but in

practice, such that the law becomes operative through observance of, or compliance with, the law. The three strands are best seen as interdependent: when law is consistent with fundamental rights, and is inclusively promulgated and even-handedly implemented, then the law will be respected by the community. Conversely, if the law is neither respected nor observed, then the societal values and objectives reflected in law will prove elusive. Ultimately, rule of law reflects a transformation of words on paper into action in the sense that the law, in effect, comes to “rule” or govern, as manifested by the conforming behavior of the regulated community.

Experience to date in the environmental setting permits a more granular understanding of the conditions necessary for formation of rule of law, as reflected by the consensus declaration contained in UN Environment’s 2013 Governing Council Decision 27/9. This decision recognized that for environmental rule of law to emerge, key “mutually supporting” governance features need to be in place, “including information disclosure, public participation, implementable and enforceable laws, and implementation and accountability mechanisms including coordination of roles as well as environmental auditing and criminal, civil and administrative enforcement with timely, impartial and independent dispute resolution.”

If this formulation generally looks familiar, there is a reason for that: it is based strongly on the U.S. experience and reflects a set of messages that our government has for decades been propagating to the rest of the world based on our conviction that these are indeed the key ingredients. Notably, “environmental auditing” as used here refers to the function of auditors general, inspectors general, and other organs of government dedicated to stemming



Scott Fulton
President

fraud, waste, and abuse in government programs. Behind this text was the recognition that, for many countries, corruption remains a major issue both generally and in the environmental context. Corruption compromises and masks environmental decisions, manipulates public awareness, clouds understanding not only of environmental conditions but also the efficacy of corrective measures, and distorts compliance assessment and commitment. So, even more than the absence of law, and more than the absence of resources, the lack of public integrity stands as the primary barrier to formation of rule of law and achievement of environmental quality around the world.

When we consider the remarkable improvements that we have achieved in this country, let’s give due credit to the system of rules and oversight mechanisms that help guarantee integrity. It’s certainly true that when you work in government, oversight can at times feel intrusive, distracting, and unwelcome. But wherever would we be without these checks?

Public integrity through independent oversight may well be the secret sauce in our rule-of-law formula, and is one of the key difference-makers around the world in advancing environmental quality.

Legal Pathways to Deep Decarbonization in the United States

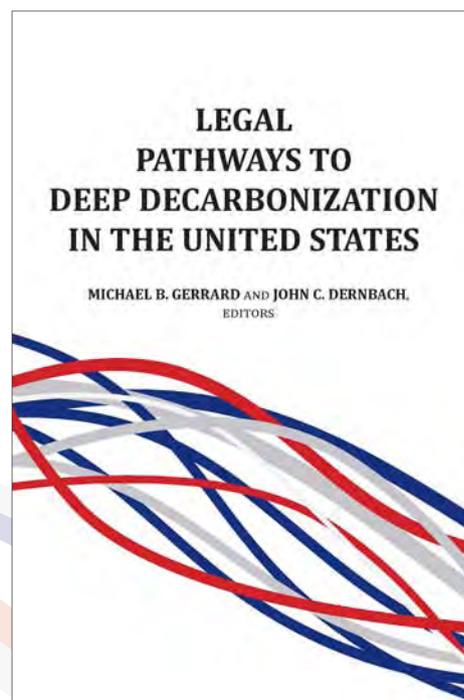
Edited by Michael B. Gerrard and John C. Dernbach

Legal Pathways to Deep Decarbonization in the United States provides a “legal playbook” for deep decarbonization in the United States, identifying well over 1,000 legal options for enabling the United States to address one of the greatest problems facing this country and the rest of humanity.

The book is based on two reports by the Deep Decarbonization Pathways Project (DDPP) that explain technical and policy pathways for reducing U.S. greenhouse gas emissions by at least 80% from 1990 levels by 2050. This 80x50 target and similarly aggressive carbon abatement goals are often referred to as deep decarbonization, distinguished because it requires systemic changes to the energy economy.

Legal Pathways explains the DDPP reports and then addresses in detail 34 different topics in as many chapters. These 34 chapters cover energy efficiency, conservation, and fuel switching; electricity decarbonization; fuel decarbonization; carbon capture and negative emissions; non-carbon dioxide climate pollutants; and a variety of cross-cutting issues. The legal options involve federal, state, and local law, as well as private governance. Authors were asked to include all options, even if they do not now seem politically realistic or likely, giving *Legal Pathways* not just immediate value, but also value over time.

While both the scale and complexity of deep decarbonization are enormous, this book has a simple message: deep decarbonization is achievable in the United States using laws that exist or could be enacted. These legal tools can be used with significant economic, social, environmental, and national security benefits.



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