Testimony: Michael Traynor Speaks to the Next Generation

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Ralph Butler

Stepping Stones

❧ As diplomats meet in Durban this December seeking to move the global economy beyond fossil fuels, it is easy to forget how daunting were the tasks facing weapons and economic negotiators, who building on a grand bargain then succeeded by proceeding in small increments.

By Ruth Greenspan Bell and Micah Ziegler
Woodrow Wilson Center and University of California

With **Another View** by Eswaran Somanathan of the Indian Statistical Institute

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Foundations of Sustainability

❧ What are the core elements of sustainable development? In the run-up to the 2012 U.N. Conference on Sustainable Development, two long-time leaders in the area, coming from countries with different levels of industrialization, put their emphasis on national governance systems.

By Scott Fulton and Antonio Benjamin
U.S. Environmental Protection Agency and High Court of Brazil

With **Another View** by Carl Bruch of the Environmental Law Institute

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Henry Payne

The Social Cost of Carbon

❧ Buried deep in the back pages of a minor, and seemingly unrelated, environmental regulation, the Obama administration has laid out its climate agenda. But estimating the results of greenhouse warming turns on a set of nested assumptions each of which can sway the ultimate answer.

By Elizabeth Stanton
Stockholm Environment Institute — U.S. Center at Tufts University

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Testimony | Note to the Next Generation

❧ Michael Traynor, the President Emeritus of the American Law Institute, pens a personal missive to the rising stars of environmental protection. His message is a hope that they will succeed where the founding generation failed — in addressing the foremost challenge of our era, climate change.

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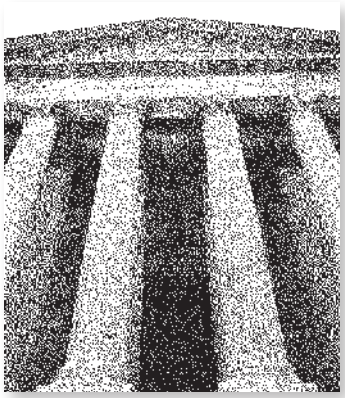

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FORUM | Should Perchlorate Be Regulated in Drinking Water?

❧ In 2008, the Environmental Protection Agency looked at the available data and concluded that regulating perchlorate under the Safe Drinking Water Act would not present a meaningful opportunity for health risk reduction. The agency is charged with regulating five new pollutants a year under the act, and the Obama EPA has pledged to add 16 chemicals to the list. Last February, the agency looked at the same data and concluded that regulating perchlorate as a drinking water contaminant would indeed lead to meaningful health risk reduction. Clearly, the science and policy surrounding perchlorate regulation is complex, with several different plausible interpretations.

COLUMNS

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Dispatches from the Climate Wars

In the years leading up to World War II, the French built an impregnable defensive line on their border with Germany, the Maginot Line. But the Germans refused to play by the rules. They simply went around the Maginot Line, invading through Belgium, and the Line (and France) fell in days.

Science-based climate policy has faced its own Maginot Line, in Washington, D.C., and other global capitals, for more than a decade. Unlike the Germans, however, the U.S. environmental community has generally played by the rules. Staying true to the adage that "generals always fight the last war, especially if they have won it," and based on three decades of successful environmental legislation, environmental armies have engaged in repeated frontal assaults on the Climate Maginot Line in search of federal energy legislation. Losses have been heavy.

The line was reinforced in 2010 by the election of dozens of members of Congress who deny anthropogenic climate change altogether. Recognizing how much stronger the line has become, the surviving environmental armies are camped out in the forests along the line, licking their wounds and plotting their next steps.

The July/August issue of *The Environmental Forum* included multiple dispatches in the battle for science-based climate policy. Reporting from the front lines, Margaret Kriz Hobson warned that key EPA units camped out along the line can expect more intense shelling, while Dan Farber explored whether there will be survivors from the *Massachusetts v. EPA* battle, and Robert Stavins reported on the increasing urgency of the conflict.

Three other dispatches, however, were different in nature and reflect efforts to advance the cause of science-based climate policy without federal legislation. Michael Vandenbergh and his colleagues introduced the view that dramatic GHG reductions can be accomplished through "the behavioral wedge." Linda Breggin calls for accountability from the 1,000 U.S. mayors who signed the Climate Protection Agreement committing their communities to "strive to meet or exceed" Kyoto Protocol targets. Stephen Emmett-Mattox and his colleagues call for adding new tools such as tidal wetland offsets to our mitigation toolbox.

These dispatches, and others coming across the news wires, are beginning to reflect the key lesson of the World War II Maginot Line — if you can't beat it, go around it. That's good news, because it's clear that in the near-term future, another frontal assault demanding federal climate legislation cannot succeed. And climate change is too important a societal risk for environmental armies to stay camped in the forest indefinitely.

Obviously history only takes us so far; science-based climate policy can't sneak through Belgium. Moreover, federal policy is critical to an effective U.S. climate change response, so the Climate Maginot Line in Washington must ultimately fall. That objective is best advanced by getting around the Line now by any means possible, encircling it from behind, and rendering it ineffective.

There are many potential weapons and tactics. Neutralizing the Climate Maginot Line requires better science education at all levels, research into perceptions of climate risk and how to effectively communicate climate risk, improved risk disclosure, political coalition building, technology innovation, state and local climate legislation, among other potential measures. Some authors have emphasized the importance of spiritual and social justice movements. Emissions reductions themselves — e.g., through voluntary programs and efficiency and renewable mandates — are important as near-term "wins," but focusing primarily on GHG emissions reductions won't have much of an impact on the Climate Maginot Line. Since really large-scale GHG reductions won't happen as long as the line is in place, environmentalists need to be strategic and outcome-focused in working to encircle and bring it down.

The plethora of available weapons and tactics has advantages and disadvantages. On the plus side, there's lots of room for innovative thinking. On the minus side, there's lot of potential dead ends. Recognizing the urgency of the situation and the limited resources available, outcome-focused thinking can help find the best ways forward. The three dispatches in last month's *Forum* help illustrate how.

• Linda Breggin argues that mayors' pledges to exceed Kyoto-level reductions targets should be seriously assessed "because of the critical role local governments can play in addressing climate change." Such pledges sound sexy, but mayors have relatively little direct influence over their cities' GHG emissions. Focusing on emissions reductions achieved will encourage creative accounting at best, and unproductive public embarrassment at worst. An outcome-focused strategy would work on what mayors really can contribute: encouraging widespread local efforts to promote climate education, and expanded climate messaging and communication, for example.

• Michael Vandenbergh and colleagues argue that the "behavioral wedge" has enormous technical potential to generate emissions reductions. True enough. But the rating program developed in the article for behavioral wedge measures gives an "excellent" score to the Cash for Clunkers program, which generated only small amounts of very expensive GHG reductions. An outcome-focused rating system would help identify measures with higher practical potential, as well as measures delivering innovation and education co-benefits.

• Stephen Emmett-Mattox and colleagues want to tap into carbon markets to help conserve and restore tidal wetlands. Carbon markets, however, are already characterized by a huge

supply-demand imbalance. From an outcome-focused standpoint, is adding new categories of offsets to the market really the best use of limited resources?

Implementing an outcome-focused strategy is hard work. It benefits from coordination, for example, where coordination is generally lacking. If climate change weren't such a serious risk, or if the Climate Maginot Line weren't so strong, maximizing the effectiveness of how the environmental armies are deployed wouldn't be as important. But that's not the situation we face. The more we learn from history, and the more we stay focused on the end-game, the more likely that the Climate Maginot Line will fall in time for federal policy to do some good.

Dr. Mark C. Trexler
Director, Climate Risk
Det Norske Veritas
Portland, Oregon

Michael Vandenbergh responds on behalf of co-authors Tom Dietz, Gerald Gardner, Jonathan Gilligan and Paul Stern:

Dr. Trexler agrees that the behavioral wedge has enormous potential to reduce carbon emissions, but he criticizes our "excellent" score for Cash for Clunkers. We agree that CARS generated small emissions reductions at high cost, but our "excellent" rating was only for its effective marketing, intervention at the point of decision, simplicity, and high potential impact. We noted that CARS "could probably have performed better from the standpoint of environmental impact and cost-effectiveness." Our point is that policymakers can achieve a huge behavioral wedge — 7 percent U.S. reductions by 2020, equal to all of the emissions of France — but only if policies combine the types of behavioral features included in CARS with a greater emphasis on emissions reductions.

Linda Breggin responds:

I agree with Dr. Trexler that an "outcome focused strategy" to achieve "science-based climate policy" is critical. I disagree, however, that "mayors have relatively little direct influence over their cities' GHG emissions" and should be limited to education efforts. Two recent articles are on point. *Scientific American* concludes that "mayors are often better equipped than presidents to cut greenhouse gases," because they "have a keener sense about how changing weather patterns will affect their cities' political and economic future." Similarly, the *Economist* asserts that cuts in greenhouse gas emissions are an easy "sell" for cities because they "are not only environmentally sound" but "also save taxpayers money." For these and other reasons outlined in my column, any strategy should include cities' reductions.

Stephen Emmet-Mattox responds on behalf of his co-authors:

Dr. Trexler's letter makes a valid point about the need for a strategic, coordinated approach to mitigate climate change. We agree, and believe a bigger picture recognizes the connections between climate change, human behavior, healthy ecosystems, and global biodiversity. While a battle is being fought on the climate change policy front, there is also a need to connect with the frontlines of ecosystem management. Extending approaches developed and developing for forests and peatlands to linked ecosystems, such as coastal wetlands, is needed. Continuing Dr. Trexler's analogy, carbon financing is a vehicle to bring management of coastal carbon to the beachheads of Dunkirk, and engage the entrenched climate change battle.

Clearing Up the Clean Air Act

Our article, "Statutory Arteriosclerosis" (July/August) called for Congress to update the Clean Air Act, because it suffers from hardening of the arteries. In response, Tim Profeta's Another View accompanying our article pointed out that not only the Clean Air Act, but Congress suffers from hardening of the arteries, while EPA does have some flexibility. We agree, but the act must be made more flexible because it is how we adapt to change.

So, the next time Congress does amend the statute, and hopefully sooner rather than later, it should supplant much of the top-down approach with the more flexible market-based approach epitomized by the acid rain program. Yes, EPA can introduce some such flexibility into the regulation of greenhouse gases under Section 111, but the National Ambient Air Quality Standard pollutants are still ruled by the many dozens of pages of the statute specifying the State Implementation Plan process. Yes, EPA can occasionally introduce some market-based flexibility into the SIP process, as with the NOx SIP call, but the workaday reality is states individually must prepare cumbersome SIPs, the trading will be balkanized under the Interstate Transport Rule and its successors, and sources are caught in between. Yes, things could be worse with the Clean Air Act, but they should be a lot better.

David Schoenbrod
Professor
New York Law School
New York, New York

Kudos on a Great Issue of the Forum

I am an ELI member and I read the *Forum* cover to cover every issue. I would like to compliment you and your staff for the July/August issue. In my opinion it is the best issue I have read in the past several years. The articles were interesting, well written, diverse, balanced, etc. I can't wait for the next issue to arrive.

Thanks and with best regards,

Orr Adams Jr.
Wegmann & Adams, L.L.C.
Metairie, Louisiana

IN THE LITERATURE

The Soiling of the South: Ducktown Smoke

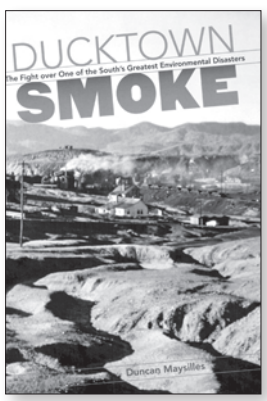
By Oliver Houck

Environmental law professors teach judicial opinions and, from time to time, a favorite question is the "top so many" in the field. Professor Lazarus and I concocted a list for a book of histories (written by others) with the usual suspects — e.g., *Calvert Cliffs, Lucas, Chevron*, and the sentimental favorite *TVA v. Hill* — but we are largely prisoners of the present. Then along comes a closely contested opinion like *Massachusetts v. EPA*, resurrecting a case like *Tennessee Copper*, and we feel the same unease that we would were a ghost to descend from the attic.

As *Ducktown Smoke: The Fight Over One of the South's Greatest Environmental Disasters* relates in scrupulous detail, *Georgia v. Tennessee* (and the Ducktown, Pittsburgh and Tennessee copper companies) was the most important environmental opinion of its time, only the second of the Supreme Court to touch on the subject, and as hard fought, divisive, intractable, political, unpredictable, and seemingly endless battle as any of today. It was before the Court nearly 15 years. It was accompanied by hundreds of private suits in state courts seeking relief from a smothering and seemingly invincible blight. It remains with us, looking on perhaps with favor at the elaborate schemes with which we now approach pollution control, but also, just maybe, with the latent authority to step in again when things go amok.

We may begin with the photos. I doubt that many of us have seen their like short of war. It is as if one were to superimpose the worst of the Dust Bowl with abandoned houses topping bleak ridges of sand, not a live stick to the horizon, gullies so deep they appear a scene on Mars, and, tying them together as if solving the mystery, a wide-angle shot of the Tennessee Copper plant on the Ocoee River, half obscured by its fumes, human figures on the riverbank dwarfed to the size of ants. The drama of these photos would, it appears, impress the Court as well.

Only, this is not a natural desert, nor a landscape devastated by farming and drought. This is the high mountain joinder of Tennessee and Georgia (and a small piece of North Carolina) where rainfall averages five and a half feet a year and which boasted some of the most lush forests in North America. Add a sprinkling of small farms with diverse crops that fed the region. They would start the cases.



Ducktown Smoke: The Fight Over One of the South's Greatest Environmental Disasters, by Duncan Maysilles, University of North Carolina Press, 2011.

Everything about the story is brutal. It starts with a land grab, only this one involved a three-way between the United States, Georgia, and the Cherokee Nation which had sided with America during the Revolutionary War and was about to be liquidated by it. Chief Justice Marshall had confirmed Cherokee rights to this land, against Georgia, only a few years before President Andrew Jackson overruled him and sent the natives packing on the Trail of Tears to another land like the moon, Oklahoma. All of which reinforced a sense of sovereignty in the Georgian soul. Enter now the first copper mining in the high Ducktown Valley, pre-Civil war, but the logistics of hauling out the ore were formidable and the industry was dying within decades, to be rescued by the arrival of rails. Everyone loved it, Georgia, Tennessee, the increasingly profitable companies. Then people began to see what was happening, and it was appalling, like death from the inside out. Visitors to the region could not view it, literally, for the smoke. The vegetation was blasted, as by an explosion, in radials that went out 10, then 20, then 50 miles. When the rains came, up to 16 feet of topsoil flushed away. The farms too.

In the late 1890s, 10 Georgia farmers brought suit for damages, nine men and a woman named Margaret Madison who sued as a "femme sole" and claimed that all she wanted was "to grow her bread and eat it." They got nowhere. Company lawyers — in a full-court press of delaying motions, jurisdictional challenges, legislative maneuvers, and other tactics plainly designed not only to wear these plaintiffs down but to deter others from even thinking about it — tendered de minimus settlements to seven farmers, had the eighth dismissed outright, and received verdicts of $100 and $60 on the remaining two, which the companies stalled off for another two years in appeals. Another brutality, in its way, of the Ducktown saga. Effectively, the industry won, which would end the story in no way remarkably nor remotely touching the high court of the United States.

What changed was the politics. Georgians became increasingly upset that neighboring Tennessee was polluting it at will and profiting from it, while their fellow citizens took the hit. The

state assembly called on the governor to act, who appointed a commission, that went to look at things and came back with photographs and a study saying that things were even worse than reported. Thus, the state attorney general brought suit, not on behalf of the farmers, but of the sovereign state. He did not call it pollution, or even smoke; this was, he said, an "invasion" on Georgia soil. And he brought his claim directly before the Supreme Court, petitioning for original jurisdiction. This was early January 1904.

The Court was no fan of original jurisdiction. It had great deference for the states, no fact finding mechanisms of its own, and no apparent way to limit these cases if it plunged in. Further, argued the companies, this was really not Georgia suing but, rather, its farmers under a state facade. Georgia, in return, rested its case on sovereignty with the not-too-subtle plea that the Court adjudicate its rights and "resolve the dispute in lieu of a show of arms and loss of blood." Advocacy doesn't get much closer to the sabre than that. The Court bought it. It accepted jurisdiction. For Georgia, that was 90 percent of the game.

The Peach State was now in the driver's seat, but precariously. The attorney general did not want responsibility for shutting down the region's copper industry; he wanted to reduce its emissions, which the companies, too, seemed ready to do. Historically they had burned down their copper ore on huge stacks of logs, smoldering for months at a time and kicking out vast quantities of sulfur into the air. No one knew much about sulfur at the time, but the smoke itself was plain. The companies were willing, on a crash basis, to bring the smelting operations indoors, eliminating the fire piles, and to dissipate the smoke through chimneys more than 350 feet in the air. It seemed a win-win. Georgia and the companies settled their case, but supervisory jurisdiction remained with the Court.

The peace did not last long. The farms and trees were still dying, the air still burned the eyes and lungs. Investigations aided by the newly minted Forest Bureau of the U.S. Department of Agriculture, concerned for the fate of southern hardwood timber, showed that the sulfur was the noxious element, and that indoor furnaces only reduced it by 30 percent. In fact, given the enormous increase in production stimulated by the more efficient indoor process, actual sulfur emissions had doubled since 1904. The parties went back to Court.

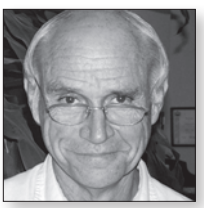
All of the arguments were aired this time, particularly the state's allegations of a public nuisance, on which the Court had rendered a recent favorable opinion in *Missouri v. Illinois,* but more recently neutered it by finding the nuisance unproved. Now in *Georgia v. Tennessee* Justice Holmes, for a unanimous Court, wrote that in its sovereign capacity a state had "an interest independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air." Stunning, sweeping, paradigmatic Holmes. (See also his language on waterfowl in *Missouri v. Holland*; one has the feeling with Holmes that he had actually been out of doors). The Court invited the parties to come up with their own remedy, within six months.

Seeking original jurisdiction in a dispute among the industries of the South

The attorney general of Georgia was faced with the same dilemma. He had a victory which, like the atom bomb, he could not drop. He was no more eager to take out this region's economy than he had been the first time. Tall stacks hadn't worked for the sulfur pollution, nor the indoor smelting which just changed the locus of the emissions. The answer was to take the sulfur out of the emissions and sell it, which it turns out that Tennessee Copper had already boasted to its stockholders that it was ready to do, at a profit. Show time. The company crashed construction on a desulfurization-acid manufacturing plant on a "titanic scale." It looked impressive, and the basis for a progressive settlement. The Ducktown corporation, however, British-owned and headquartered in London, was less sensitive to local pressures and refused to engage. Fast-forward to British Petroleum.

In the end, Tennessee Copper settled and Ducktown received court-ordered reduction limits that read like a modern permit. These limits were raised for proclaimed "war needs" in 1918, but the mold was set. The Court's decisions had forced an ad hoc, best-available-technology process on this one industry that was a full 60 years ahead of its time. They also installed an arbitration process for private claims that paid out small amounts to farmers . . . but then again, what could compensation really do? Sophisticated and difficult litigation against copper smelters continued throughout the century, throughout the west, and by the Tennessee Valley Authority for contamination of its reservoirs. When the 1996 Olympic kayak events were held on the Ocoee River below the Ducktown valley, they were floating on water void of biological life. Decades-long restoration efforts have brought scrub pines to part of the landscape, but it will take much more.

The U.S. Congress since overtook *Georgia v. Tennessee* with a number of complex pollution programs. The Supreme Court has, concomitantly, backed away from the nuisance approach articulated by Holmes a century ago. Yet the language remains. Here it is, winning Justice Kennedy's vote in *Massachusetts v. EPA*, ostensibly about standing but more powerfully about a state's constitutional right to defend its air and forests from outside influences. Analogies come to mind.



Oliver Houck is Professor of Law at Tulane University in New Orleans, Louisiana.

By Margaret Kriz Hobson

Rules Envision New Electricity Strategy

In late summer, federal regulators finalized ground rules for building millions of dollars of high-voltage transmission lines needed to make the nation's electricity grid more reliable and pave the way for renewable energy. The Federal Energy Regulatory Commission issued new rules that, among other things, require utilities to join a regional planning group to coordinate which transmission projects can be built and who will pay for them.

FERC Chairman Jon Wellinghoff says the policies are necessary to accommodate the changing profile of the nation's electricity supply. Thirty states now require their utilities to provide customers with electricity from renewable sources. Those state mandates have caused a rush to build transmission lines to often distant renewable projects. He predicts that the new regulatory structure "will provide consumers with greater access to efficient, low-cost electricity."

But the rules are coming under attack from state regulators and utility executives who argue that FERC is giving the regional planning organizations too much authority. They say the plan could force consumers to pay for big ticket projects even if they receive no direct benefits.

Critics are also challenging the way FERC has determined who should pay for the new transmission lines. The regional groups can require consumers to chip in if they receive power from the new lines or if their local electricity network would become less congested and more reliable as a result of the new project. There is also a controversial provision that would force consumers to contribute to projects that help utilities meet state or federal public policy requirements, such as state renewable electricity mandates or clean energy requirements.

In addition, the rule requires regional groups to work with neighboring planning panels to pave the way for companies to build massive long-distance power lines. "In essence, a government authority is telling the regions that they not only have to coordinate with their neighbors, but with the neighbors' neighbors," says John Moura, manager of reliability assessments at the North American Electric Reliability Corporation, a quasi-governmental group that monitors the reliability of the nation's electricity network. "This is necessary because this is a dynamic grid. Any addition to the transmission system is a benefit to all. If it alleviates problems in my system, then you don't have to be there for me if I have trouble."

The new rules are coming under attack from state regulators and utility executives

Not everyone agrees with that broad cost-sharing arrangement. Some Michigan state officials and consumers say the new rule is reminiscent of a 2010 FERC ruling that allowed a Midwest transmission planning group to charge Michigan customers for long-distance lines that the state officials say would provide almost no benefits to the state's customers. "We're being told to pay for lines that will carry wind out of North Dakota," says Steve Transeth, who represents a consumer coalition. "But we won't benefit from that because we have our own electricity standards that require our utilities to build renewable energy in the state."

Transeth wants FERC and Congress to reconsider whether consumers should be asked to pay for a national network of new transmission. "We seem to be accepting the premise that we need to build new transmission to bring wind out of the West," he says. "But we haven't actually engaged in the right debate, which is: is it better to have a more localized distributive system like Michigan advocates? What is most economical? And what is going to be the most efficient in terms of actually delivering for our power ratepayers?"

FERC is also being accused of overstepping its authority. Sue Sheridan, who heads the utility industry's Coalition for Fair Transmission Policy, questioned whether the commission can empower the regional groups to approve and fund expensive projects. "Congress has never directed FERC to take this kind of step," said Sheridan, a former legislative aide to Representative John D. Dingell. "FERC's job is to make sure that rates are just and reasonable, but this seems far afield from the core mission that Congress assigned FERC."

But advocates of the transmission rule say the nation has long embraced a competitive electricity marketplace. "A lot of folks portray this rule as a pretty radical order that plows a lot of new ground," notes James Hoecker, who headed FERC during the Clinton administration. "But it really doesn't. We forget that this process has been going on since the 1990s." Hoecker, who is now a lobbyist for WIRES, a transmission owners and investors group, said FERC's ultimate goal is to create "the most competitive markets possible, the most liquidity, the most accessibility, the most diverse resources of energy as possible. And then let the market decide what's cheap and what isn't."

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By Linda Breggin

Greening the Power of the Purse

This November, voters in Boulder will decide whether the city should create a new municipally run utility to replace a privately owned energy company. As explained by the city, the measures at issue are driven in part by the city's efforts to meet its greenhouse gas emissions targets. "Boulder made a commitment to reduce its carbon footprint in response to the climate change crisis" and a new local utility "would be able to increase renewables and support local energy-related businesses." In contrast, the private energy company is "poised to make significant investments in fossil fuel generating resources."

The ballot measures are controversial. But, setting aside the merits of this particular initiative, the city's actions reflect what may be a growing and powerful trend. States and localities are using the power of the purse to buy green goods and services. And, it is a big purse. The Pew Center on the States reports that states spend $200 billion annually on goods and services.

State and local programs vary considerably in scope, focus, and approach. But states from coast to coast, red and blue, are taking action. Some programs mirror aspects of the Environmentally Preferable Purchasing Program administered by the Environmental Protection Agency, which assists federal agencies in meeting green purchasing requirements.

"Environmentally preferable" is defined as "products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose." It can apply, for example, to raw materials, manufacturing, packaging, use, maintenance, and disposal.

Although not all environmentally preferable purchasing actions are as bold as Boulder's, many states have stepped up green power purchasing. Delaware, as a result of bulk purchasing for its facilities and schools, achieved a 32 percent green power purchase this year. Under a new law and executive order, Virginia plans to transition its fleet of 4,000 passenger vehicles to those that run on alternative fuels. In the governor's words, the initiative provides the "private sector an opportunity to develop creative partnerships to help the commonwealth meet its goals."

That is not to say that greening government procurement policies is easy. The National Association of State Procurement Officials warns that implementing environmentally preferable purchasing programs can meet with "administrative hurdles, technical barriers and skepticism" from both purchasers and users.

States and localities are improving their purchasing — and they do a lot of purchasing

Fortunately, there are plenty of green procurement resources for states and localities. The federal government and numerous private sector organizations offer various types of support, including databases of environmentally preferable products and services ranging from cleaning to electronics. In addition, some state programs have developed tools, such as Massachusetts's EnviroCalc, a downloadable spreadsheet that estimates the environmental benefits of purchases of recycled-content and energy efficient products.

Not only does green purchasing benefit the environment, but it also can save money. *The Economist*, in an article discussing Chicago's climate change initiatives, observes: "City buses inevitably need replacing; so why not replace them with hybrid models that are not only 60 percent lower in carbon emissions than standard diesel buses, but also 30 percent more fuel-efficient and will save an estimated $7m a year in fuel and upkeep?"

This also explains why a down economy may not substantially affect green purchasing. The Responsible Purchasing Network, a group of procurement and sustainability professionals, surveyed its members and found that the recession "largely spared, and in some cases, even helped responsible purchasers," in part because "green spending yields cost savings." In fact, some state programs report their cost savings. Massachusetts saved over $3 million last year and plans to quantify the environmental benefits of its purchases.

Ultimately, however, green procurement has broader implications than cost-savings for individual states and localities. For example, a 2006 Consortium for Energy Efficiency study explains that the buying power represented by state and local government energy-related expenditures could transform the entire market for energy-efficient products. According to the study, if states and localities green the tens of billions of dollars they spend on energy-related purchases, the market may respond with more choices and lower prices for all buyers. The report also emphasizes the unrealized opportunities for collaboration on energy-efficient purchasing among jurisdictions and across local, state and federal levels of government.

Regardless of the outcome of the Boulder initiative, we can expect states and localities to continue to use the power of the purse in creative ways that not only help the environment but save them money.

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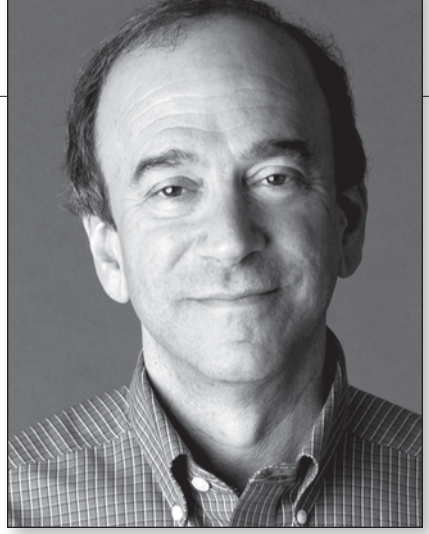

By Richard Lazarus

States Carp Over Asian Carp Invasion

The Seventh Circuit's opinion in *Michigan v. Army Corps of Engineers* is a reminder that the law of unintended consequences is one of environmental protection's most important precepts, notwithstanding its lack of formal expression in any constitutional, statutory, or regulatory provision. The law's latest victims are the state of Illinois and the city of Chicago, as they struggle to avoid an environmental catastrophe rooted in their own efforts a century ago to solve a very different kind of environmental problem.

In 1900, Chicago faced a serious public health hazard. Sewage dumped in the Chicago River had a nasty habit of flowing into Lake Michigan and washing up on the city's shores, leading to a typhoid epidemic. Chicago and Illinois constructed an artificial canal from the Chicago River to the Desplaines River, which effectively reversed the flow of the Chicago away from Lake Michigan and toward the Mississippi River. But, as alleged in a complaint filed by Missouri in 1900 with the Supreme Court, the flow reversal "sen[t] fifteen hundred tons of poisonous filth daily into the Mississippi . . . mak[ing] it unfit for drinking, agricultural, or manufacturing, purposes."

In an opinion by Justice Oliver Wendell Holmes, the Supreme Court in 1906 dismissed Missouri's complaint. The Court concluded that Missouri had failed to prove causation, as required to sustain a nuisance action. The Court applied the "strictest proof" because of the novelty of the allegations, which "depend[ ] upon the inference of the unseen," and because Missouri and the city of St. Louis, too, dumped raw sewage into the Mississippi.

A century later, Illinois and Chicago find themselves a victim of their earlier technological success and once again embroiled in nuisance action. But this action bears little resemblance to the one brought by Missouri decades ago. Its genesis is the same flow reversal, but the immediate problem is that the hydrological connection that caused that reversal is now allowing an invasive fish species — Asian carp — to travel in the opposite direction from downstream rivers in Missouri and Illinois into Lake Michigan.

This is no small matter. Nor, certainly, are the fish themselves. They can be three to five feet long, weigh from 60 to 150 pounds, consume as much as 40 percent of their body weight daily, reproduce at enormously rapid rates (one fish can have four million eggs), and they have a dangerous habit of leaping high into the air and injuring people in passing boats. Exploiting the artificial channels constructed to address the sewage problem, the Asian carp are on the hydrologic precipice of reaching Lake Michigan. Once in Lake Michigan, they will inevitably invade all the Great Lakes, and potentially destroy one of the world's largest freshwater resources and the billion-dollar industries dependent on those resources.

It's not a fish story: an environmental solution turns into an environmental problem

Beginning in 2009, several states bordering Lake Michigan sued Illinois and Chicago, arguing that the carp are in effect "pollutants" amounting to a nuisance. After the Supreme Court declined to hear the case in the first instance, Michigan, Minnesota, Ohio, Pennsylvania, and Wisconsin filed a complaint in district court against the U.S. Army Corps of Engineers and the Metropolitan Water Reclamation District of Greater Chicago. The complaint challenged the defendants' failure to take the steps necessary to prevent the carp from entering Lake Michigan by controlling the canals, channels, locks, and dams that link the lake to Mississippi tributaries.

On August 24, the Seventh Circuit upheld the trial judge's refusal to issue a preliminary injunction. But the court's view was far more sympathetic than Holmes's 1906 ruling. The court disputed the trial court's view that the plaintiffs had only "minimal chance of succeeding on their claims." And, rejecting the defense that carp are not traditional pollutants, the appeals court held that plaintiffs had presented sufficient evidence that "the carp will invade Lake Michigan in numbers great enough to constitute a public nuisance" and cause irreparable harm.

However, analogizing to the Supreme Court's recent ruling in *American Electric Power v. Connecticut* that EPA's authority under the Clean Air Act displaced the federal common law of nuisance, the court reasoned that preliminary equitable relief was nonetheless improper because of ongoing agency efforts to address the carp issue. Yet, the court warned that "this conclusion can be revisited" should "the agencies slip into somnolence" or in light of new information.

Should, however, the court decide in the future to fashion any equitable relief, the court would be well advised to be wary of the law of unintended consequences. After all, government officials originally promoted the introduction of Asian carp into tributaries of the lower Mississippi for environmentally beneficial purposes: to reduce "naturally" weeds, parasites, and nutrients in those waterways.

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By Elliott P. Laws

Progress Difficult In Today's Climate

After a surprising 10 years as the author of THE BUSINESS OF ENVIRONMENT, I have asked my good friends at the Environmental Law Institute to let me step down and pass this space on to a new contributor. This will be my last column.

In thinking about the past decade and what has transpired in the environmental arena, I thank ELI and my editor, Steve Dujack, for allowing me the freedom to opine on many diverse and controversial topics. This column has afforded me the freedom to express my views and provide my unsolicited advice to the private sector, nongovernmental organizations, Congress, and the various administrations. I hope that ELI continues to afford my successor with this same degree of freedom. When they begin writing, they certainly will have a smorgasbord of issues from which to choose.

In some respects I am sad to be giving up this forum, but in many more ways I know that the time has come. Environmental issues and how they impact the business community have changed markedly over the past decade. My first column, the first of many which gave unsolicited advice, was directed to the incoming EPA administrator, in this case Christie Todd Whitman, and spoke of opportunities and tried to warn of potential pitfalls. The one pitfall I alluded to but did not discuss in enough detail was the potential for a complete lack of support from the White House.

My last substantive column talked about how EPA should deal with the unprecedented decisions it will need to make on programmatic priorities based upon the deep budget cuts it will endure in the coming fiscal years. Between those two columns I have written on such specific issues as environmental justice, chemical regulation, challenges facing and opportunities present for the agency's leadership, the European Union, Superfund, climate change, diversity in hiring, recycling, mining, renewable energy, and cost-benefit analysis. I have also written generally on environmental issues involving Congress, states, corporations, NGOs — and any other number of diverse and important environmental and business issues.

At the same time we have seen a steady increase in environmental issues that are framed more in terms of politics than protection of human health and the environment. Many will say that has always been the case, but few could disagree that the pendulum has swung to the point that the substance of the environmental issues is constantly drowned out by the drumbeat of partisan politics. Former EPA administrator William D. Ruckelshaus wrote in these pages 15 years ago that the pendulum always swings back, but this swing seems different these days in that it is part of a broader tension in the country. This is not an "environmental" swing, but rather a more pronounced split in the political positioning of the United States. The natural down sweep of the pendulum is likely to be slower, if it occurs at all.

We have lost the ability to negotiate and compromise on environmental issues

How we got here is an issue for historians and political scientists. However, we as environmental professionals and practitioners must figure a way out of this stagnation. The "all or nothing" approach of both sides of the debate only leaves us all as losers. The unfortunate part is that when you speak to both sides separately, they will acknowledge that there is a workable middle ground.

However, it now appears to be unfashionable, or weak, to offer compromise. It is well established in the fields of law, diplomacy, and almost all human interactions that a declaration against self-interest serves an indicator of honesty, and can lead to similar declarations by other parties and ultimately honesty and compromise. No one these days is willing to take that first step — to make as simple a statement as "I can't give up on this, but I can on that." We have lost the ability to negotiate and compromise on environmental issues — clearly to the nation's detriment.

How do we fix this? Well, I fear that unless all stakeholders recognize and are fully committed to adhering to the following principles, real progress (be that legislative or regulatory) in addressing our challenging environmental issues will be hard to achieve.

Principle 1: human health and the environment must be protected for this and future generations of Americans. Principle 2: American business must be able to operate at a profit. Both of these principles are so simple, so obvious, so much a part of what we are as a nation that it is difficult for me to understand why each side at times dismisses the other's principle as folly or whimsy.

Abandoning rationality to preserve political posturing must end. I recognize that to accomplish this will present challenges to both sides of the stakeholder chasm, which admittedly could find it easier to stay the course rather than engage in meaningful discussions with their political opposites. But that dynamic has to change or we risk irreparably harming this nation which all players profess to love.

Elliott P. Laws, former EPA Assistant Administrator and former President for Safety, Health & Environment of Texaco, is a Partner at Crowell & Moring. He can be reached at elaws@crowell.com.

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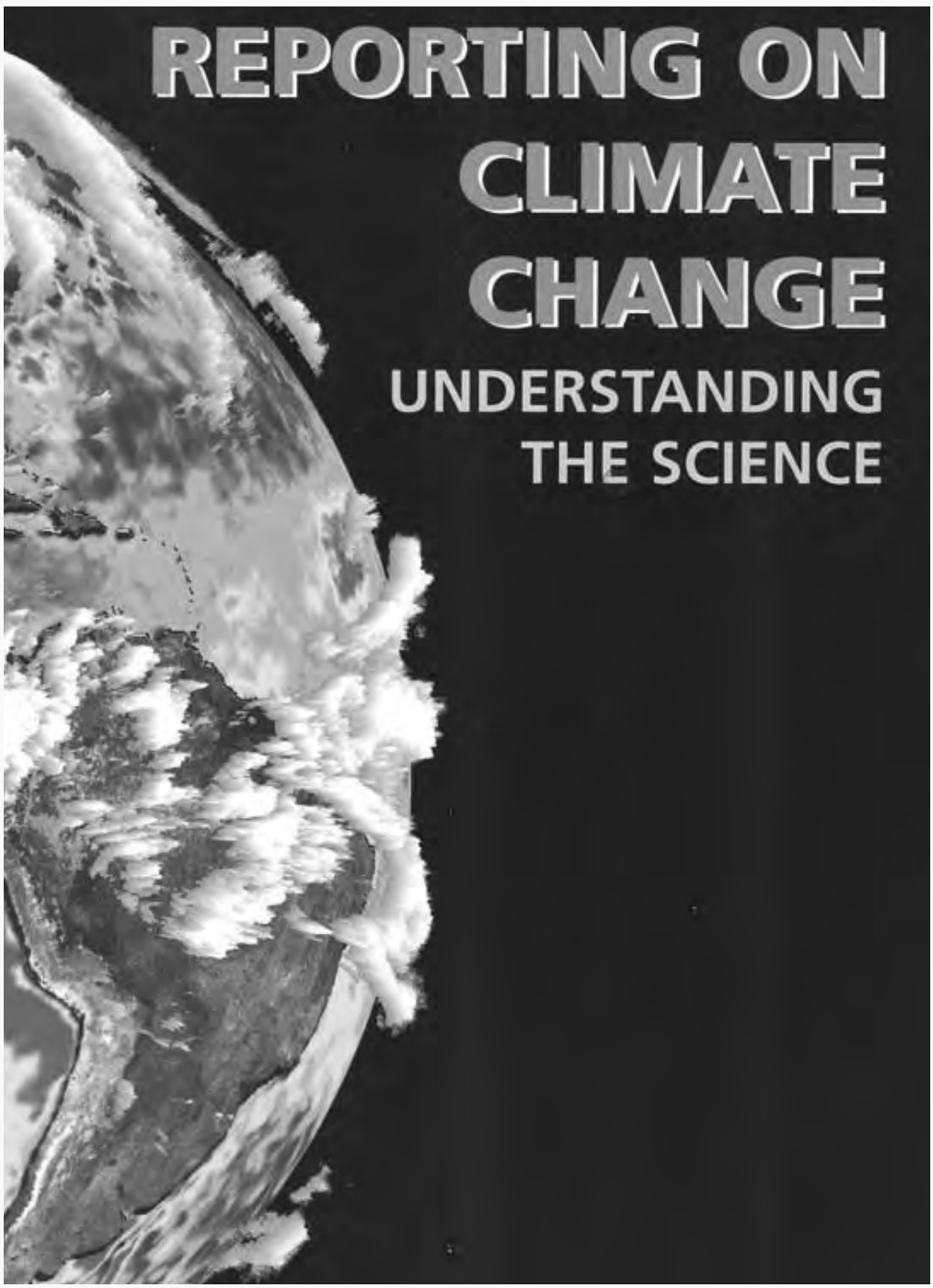

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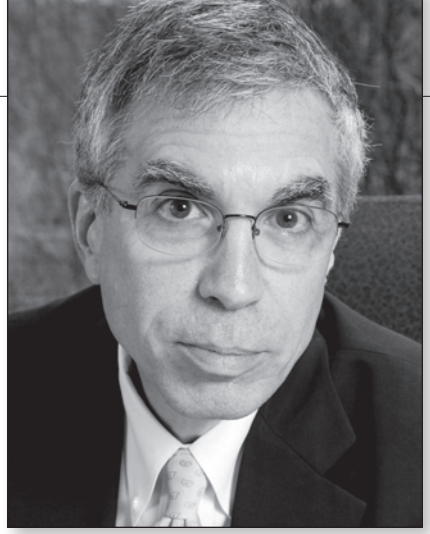

By Robert N. Stavins

Polarized Politics Paralyze Policy

There is a widening gulf between the two political parties that is paralyzing sensible policy action in Washington. This increasing polarization — the disappearance of moderates — has been taking place for four decades. The rise of the Tea Party movement is only the most recent vehicle that has continued a 40-year trend.

Why has party polarization increased so dramatically in the Congress over the past four decades? Three structural factors stand out.

First, there is the increasing importance of the primary system, a consequence of the "democratization" of the nomination process that took flight in the 1970s. A small share of the electorate vote in primaries, namely those with the strongest political preferences — the most conservative Republicans and the most liberal Democrats. This self-selection greatly favors candidates from the extremes.

Second, decades of redistricting — a state prerogative guaranteed by the Constitution — has produced more and more districts that are dominated by either Republican or Democratic voters. This increases the importance of primary elections, which is where the key choices among candidates are now made in many congressional districts. Because of this, polarization has proceeded at a much more rapid pace in the House than the Senate.

Third, the increasing cost of electoral campaigns greatly favors incumbents (with the ratio of average incumbent-to-challenger financing now exceeding 10-to-1). This tends to make districts relatively safe for the party that controls the seat, thereby increasing the importance of primaries.

These three factors operate mainly through the replacement of members of Congress, whether due to death, retirement, or challenges from within the party — that is, the ideological shifts that cause increasing polarization largely occur when new members are elected from either party, although a disproportionate share of polarization has been due to the rightward shift of new Republicans.

To a lesser degree, polarization has also taken place through the adaptation of sitting members of Congress as they behave more ideologically once in office. Such political conversions are due to the same pressures noted above: in order to discourage or survive primary challenges, Republican members shift rightward and Democratic members shift leftward. Senator John McCain (R-Arizona) evolved from being a moderate at the time of his 2008 presidential run to being a solid conservative in 2010, in response to a primary challenge from a Tea Party candidate.

It is difficult to be optimistic about the prognosis for American politics

If the increasing polarization of the Congress is due to these factors, then it is difficult to be optimistic about the prognosis in the near term for American politics, because it is unlikely that any of these factors will soon reverse course.

The two parties are not about to abandon the primary system to return to smoke filled back rooms. Likewise, state legislatures are not willing to abandon their power to redistrict (although California's experiment with an independent citizens commission may provide hope). And public financing of campaigns and other measures that would reduce the advantages of incumbency remain generally unpopular (among incumbents, who would, after all, need to vote for such reforms).

Of course, in addition to these long-term structural factors, shorter-term economic and social fluctuations also have pronounced effects. In particular, significant economic downturns — whether the Great Depression of the 1930s or the Great Recession of the past several years — increase political polarization.

The 1930s saw not only the rise of American socialists and communists, but also the rise of American right-wing extremism. It took World War II to bring an end both to the economic upheaval of the 1930s and the destructive political polarization that had accompanied it.

U.S. participation in the war brought a degree of political unity at home, largely because U.S. action was precipitated by the attack on Pearl Harbor. Under conditions of less clear motivation for U.S. military action abroad — such as in the war in Vietnam — the result has not been political unity, but divisiveness and polarization. The ultimate impacts on domestic politics of the wars in Afghanistan and Iraq may hinge on whether they are perceived to be patriotic responses to a foreign attack (9/11) or manifestations of U.S. military adventurism.

So, it's reasonable to anticipate — or at least hope — that better economic times will reduce the pace of ongoing political polarization. But in the face of the three long-term structural factors I've identified — increasing importance of primaries, continuing redistricting, and increasing costs of electoral campaigns — it is difficult to be optimistic about the long-term prognosis for American politics. I hope I'm wrong.

Robert N. Stavins is the Albert Pratt Professor of Business and Government at the John F. Kennedy School of Government, Harvard University, and Director of the Harvard Environmental Economics Program. He can be reached at robert_stavins@harvard.edu.

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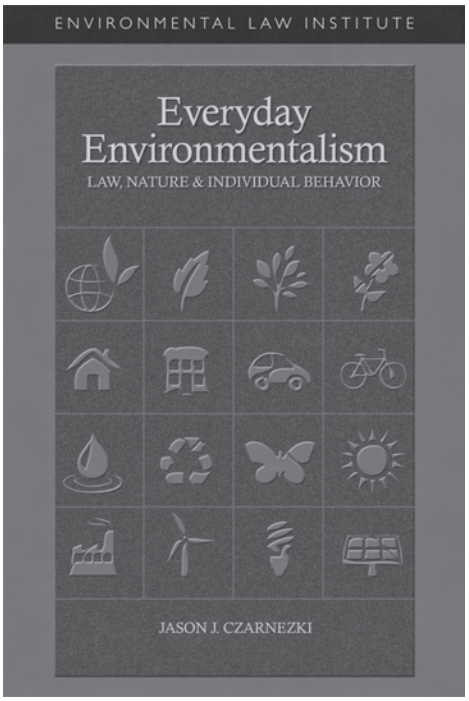

Jason J. Czarnezki is a Professor of Law in the Environmental Law Center at Vermont Law School, home to one of the nation's leading environmental and natural resources law and policy programs. Previously, Professor Czarnezki served as a law clerk to the Honorable D. Brock Hornby of the U.S. District Court for the District of Maine and as a law clerk for the Bureau of Legal Services at the Wisconsin Department of Natural Resources. Professor Czarnezki received his undergraduate and law degrees from the University of Chicago.

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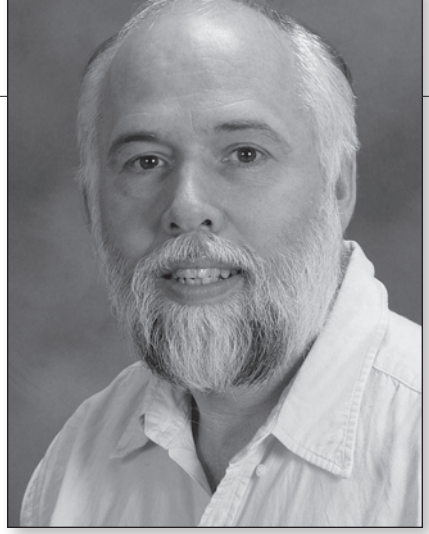

By Craig M. Pease

TSCA: Economic Limits to Science

Ongoing efforts to revise the Toxic Substances Control Act highlight both what science can contribute to environmental law, and what it cannot. On paper, TSCA creates a comprehensive scheme for identifying and regulating chemicals not otherwise regulated (such as pesticides, pharmaceuticals, and food additives). Alas, there is near-universal acknowledgment that it has failed. For a wonderful introduction and details, I heartily recommend ELI's ongoing series of webinars on TSCA reform.

As The American Academy of Pediatrics has stated in a recent policy statement on TSCA reform, "it is widely recognized to have been ineffective in protecting children, pregnant women, and the general population from hazardous chemicals in the marketplace. It does not take into account the special vulnerabilities of children in attempting to protect the population from chemical hazards. Its processes are so cumbersome that in its more than 30 years of existence, the TSCA has been used to regulate only five chemicals or chemical classes of the tens of thousands of chemicals that are in commerce."

The issues identified by the academy are but superficial symptoms of a much deeper underlying problem, to wit: the approach to regulating toxic chemicals taken both by the current TSCA and by proposals for a reformed TSCA are bound to fail, for lack of money, time, skilled scientists, and technological know-how (think really expensive machines for measuring really small things).

In regulating toxic chemicals, scientific and economic considerations are hopelessly intertwined. As stated in the American Chemical Association's policy statement on TSCA reform, "EPA should have the staff, resources, and regulatory tools it needs to ensure the safety of chemicals." Well, just what resources might EPA need? There are roughly 80,000 chemicals in commerce, of which roughly 62,000 were in commerce in 1976 when TSCA was enacted. Of those, EPA has investigated perhaps 200 (that is, one chemical in every 300), and regulated 5 (or one chemical in every 12,000). Arguably, they have done a little better than this since EPA sometimes issues one regulation covering a class of closely related chemicals, as with PCBs.

Glory in science comes from discovering what was before unknown. The first studies on DDT, dioxin, and asbestos toxicology brought fame (if not fortune) to their authors. Critically, EPA' regulatory toxics program has gone very little beyond the chemicals that those first scientists seeking toxicological glory investigated. There is less glory (and little funding) available to the scientist who would today set out to investigate the toxicity of chemical number 57,871.

EPA needs a factory turning out toxicity widgets at a price society can afford

What EPA needs is not scientific glory, but a cost-effective way of screening large numbers of chemicals for toxicity. Scientists have a proclivity to work on the frontiers of knowledge, where they burn lots of scarce and expensive resources. Rather, EPA and society need a factory, churning out toxicity widgets at a price society can afford.

Ultimately, the solution will lie in developing new technology allowing us to predict with good accuracy which chemicals will be toxic, and how — without undertaking extraordinarily expensive empirical studies on each and every separate chemical. That technology is now being invented. See for example Anand and Mehendale's recent review on computational toxicology. Alas, it is also an emerging technology, itself on the cutting edge. The dilemma is that we can't at present do toxicity studies in a cost-effective manner, and the most likely solution is itself not currently cost-effective.

Our existing regulatory regime for toxic chemicals largely keeps science and economics separate. In this way, it is badly inconsistent with the reality of how intertwined scientific and economic considerations are in the real world. Although EPA has primary responsibility for promulgating rules to implement TSCA, that decisionmaking authority is subject to the Office of Management and Budget's additional review of a rule's costs and benefits. OMB's separate economic review often delays EPA action. As I write, allegations fly about an ongoing OMB review of an EPA proposal to add several chemicals to TSCA's list of "chemicals of concern."

More specifically, TSCA's regulatory framework fails to acknowledge the role of money and resources in limiting science. Its approach is chemical by chemical, one at a time, requiring good, rigorous, empirical evidence on each. When Congress wrote TSCA, they asked that the then emerging, shiny new science on DDT, dioxin, and asbestos be duplicated for tens of thousands of chemicals, without contemplating the immense financial and practical problems inherent in taking emerging science being done on a handful of chemicals, and scaling it up.

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By Gabrielle Williamson

Emissions Trading Earns Its Wings

The European Trading System is the largest market for greenhouse gas allowances, covering approximately 11,000 power stations and plants in 30 countries. As experience was gained under the cap-and-trade system, the European Commission decided to extend it. The measure, passed in 2009, covers aircraft, currently accounting for three percent of total GHG emissions and likely to double by 2020. But the case of air travel illustrates that regional systems are often not the best choice.

The ETS now covers aircraft taking off and landing at EU airports, measuring the entire level of emissions produced during the flight. At this point, the unilateral approach literally sees its limits. Air traffic is, by its very nature, a cross-border business. It is no surprise that airlines registered in non-EU States are challenging the initiative before the European Court of Justice. Airlines from EU Member States, while not joining in the litigation, are equally concerned about the new approach.

The litigation started with a claim for judicial review before the High Court of Justice of England and Wales seeking the annulment of measures implementing the new system in the United Kingdom. The applicants were the Air Transport Association of America and three U.S. airlines, American, Continental, and United, who chose the UK as their administering EU Member State and, therefore, fall under its jurisdiction. National courts within the EU cannot rule on the validity of EU legislation. Thus, the High Court presented a request for preliminary ruling to the ECJ.

The plaintiffs claim that the limits are contrary to customary international law because emissions outside EU airspace are being factored into the calculation, which violates the sovereignty of third states. In contrast, the defendant, the UK, argues that the trading scheme only sets up conditions under which an aircraft may depart from a European airport or arrive there.

The plaintiffs also questioned the unilateral application of the ETS to aircraft of non-EU States because the Kyoto Protocol requires countries to provide for the reduction of emissions from aviation by a global sector-specific approach in the framework of the International Civil Aviation Organization. The EU system, the defendant says, is not unilateral since it takes potential complementary trading systems into account to avoid double charging.

An attempt to broaden the EU greenhouse gas reduction scheme runs into some turbulence

Finally, the plaintiffs claim that additional expenses for emissions certificates constitute an unlawful charge under the Chicago Convention and the EU-U.S. Open Skies Agreement, assuming that both treaties limit and determine the scope of EU provisions. The defendant countered that the ETS is not a charge, but a market-based mechanism which does not necessarily generate costs and is not linked to the right to transit or enter EU territory.

In its judgment, the ECJ will have to pronounce on the existence and the scope of provisions of international customary law opposed to jurisdiction and extraterritorial regulation in the field of aviation. Another issue is the right of private parties to challenge EU law using principles of international law. The ruling is not expected to be handed down before next spring.

In the interim, the EU initiative is facing strong opposition both in the United States and China. In July, Representative John Mica, Chairman of the House Committee on Transportation and Infrastructure, introduced the European Union Emissions Trading Scheme Prohibition Act of 2011. This legislation is meant to exempt U.S. aircraft from the EU system, directing the Secretary of Transportation to prohibit U.S. airlines from participating. According to the sponsors, the bill signals to the EU that its system violates international law and U.S. companies are not going to be party to it. It also attempts to create more time for the ICAO process to work.

The Chinese Government, in contrast, responded with economic threats, announcing a freeze on an order for 10 Airbus A380 jets. "Trade war" is an often used notion in this context. However, there is much saber rattling. U.S. politicians say that the EU approach puts U.S. airlines at a competitive disadvantage. This assumption is disputable, given that the new system applies to all aircraft, regardless of nationality. The final consequence of being subject to an operating ban within the EU in case of non-compliance with the trading system may be more harmful.

With its unilateral approach, the EU also responds to a longtime stall in attempts to achieve a binding global emissions trading system. A possible venue for reaching a global solution on carbon trading initiatives in the air traffic industry may be the World Trade Organization. In this respect, the concept of emissions trading seems to be caught in a dilemma between regional restraint and more time spent at the global negotiating table.

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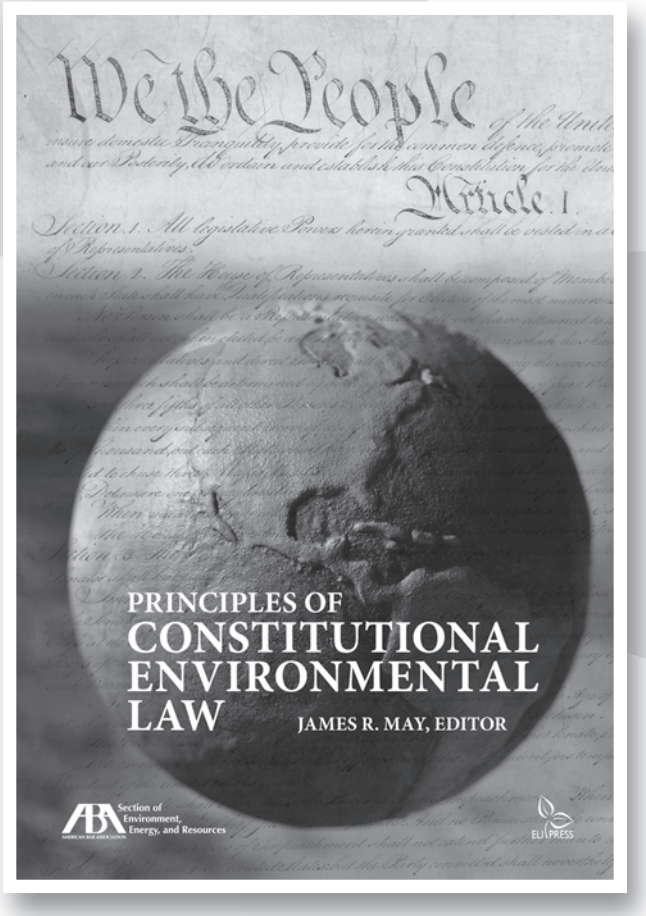

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ABA Section of Environment, Energy, and Resources
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Finding Value in Constructive Debate

Readers should please take note of a robust exchange of views at the front of the magazine under the rubric of FORUM@ELI.ORG. That's our email address, and we invite your letters to the editor on topics raised in our pages or otherwise are of concern to the environmental profession. Readers already know that the exchange of views is part and parcel of what *The Environmental Forum* is. We announce it on the cover, and we carry it out throughout our pages.

The *Forum* is unique among environmental magazines and especially so among those that focus on policy. It is the only environmental magazine that I know of whose mission is dialogue among the various sectors. It is the only environmental magazine that has as its mission to print the views of industry alongside those of the environmental community, government officials, academics, lobbyists, consultants, journalists, and the environmental bar. Although we make such an effort, including an effort to print ALTERNATIVE VIEW sidebars alongside our feature articles, this is a task we undertake on our own initiative — we are not obligated to do so by some Platonic paradigm on environmental communications, but choose to do so in the interest of constructive dialogue, a chief mission component of the Environmental Law Institute and so far as I know unmatched elsewhere.

Our feature articles are balanced among the various stakeholder groups as are our columnists, and this is an obligation we place on ourselves, not because it is the way it is done in the publishing business, for the *Forum* is striking new ground, but because we find value in constructive debate. It is important to remember this in terms of our unique service to the environmental profession.

The *Forum* is about environmental protection and is the magazine for professionals in the field. Its mission is to advance environmental protection through debate, analysis, and opinion, and this is expressed in its motto on the cover. It uses a formula of various parts — feature articles and their sidebars, columns, profiles, and our signature section, THE FORUM, a debate in print — to accomplish its mission. No other magazine so well serves this audience, and ELI is making a valuable contribution to the expertise of the profession and the resolution of contentious issues in environmental policy and law.

"It is a peculiar feature of the EU Environmental Noise Directive that it defines 'environmental noise' in a very specific sense.... The directive does not cover workplace noise, construction noise, entertainments noise, noise nuisance, fireworks noise, consumer product noise, and noise transmission within and between dwellings and other forms of neighborhood noise."

— The Times of Malta

The *Forum* is a mixture of 21st century technology and 18th century philosophy. It is a storehouse of opinion and analysis and discussion much like the coffee houses that began appearing around 1700 in the colonies. It takes at heart the principles of "within the watchwords of accuracy and fairness," as expressed in our article guidelines, authors are expected to take a firm and provoca-

Widespread Support for EPA Efforts on Climate Change

The League of Conservation Voters released polling by the Republican firm Public Opinion Strategies demonstrating very strong support for EPA efforts to reduce global warming pollution. They found:

"Fully 71 percent indicate support for requiring reductions in carbon emissions, including a solid majority of Republican voters . . . . 'Despite the rhetoric coming from most of the Republican presidential candidates, this poll demonstrates what previous research has consistently shown: Americans across the country — including Republican voters — trust the EPA to limit global warming pollution,' said LCV Senior Vice President of Campaigns Navin Nayak"

These results are consistent with over a dozen polls taken in the last two years. Here's more detail:

"Support for 'the U.S. Environmental Protection Agency requiring reductions in carbon emissions from sources like power plants, cars, and factories in an effort to reduce global warming pollution' is widespread and broad based. Majorities of a wide range of key voter subgroups support this, including among Republicans (55 percent support), independents (72 percent support, and Democrats (89 percent support)."

***— By Joseph Romm in* Grist.org**

tive point of view and defend it with an array of persuasive facts and argumentation.

So how do we know which opinions to print? Are all expressions free for the making? In a word, no. In deciding which articles to publish, the *Forum* takes to heart the opinion in the 1735 court case in which *New York Weekly Journal* editor John Peter Zenger was tried for libel by the governor and found not guilty on the grounds that the accusations were true. Or as Thomas Paine said on another, slightly later occasion, "It is error only, and not truth, that shrinks from inquiry."

The readership is a necessary filter in this enterprise. Benjamin Franklin perhaps put it best, when he wrote in the *Pennsylvania Gazette,* "Printers are educated in the belief that when men differ in opinion, both sides ought equally to have the advantage of being heard by the public; and when Truth and Error have fair play, the former is always an overmatch for the latter." Franklin believed "there would be very little printed if publishers offended nobody."

In final analysis, and we take this to heart, Thomas Jefferson's admonished that "an enlightened citizenry is indispensable to the proper functioning of a republic." As you no doubt know, Jefferson wrote separately that given a choice between newspapers and government, he would choose the former.

Indeed, publications like the *Forum* provide a unique insight into the functionings of government as well as business and environmental groups and all the other stakeholders in the environmental conversation. I should mention that it should be clear to our readers that writers represent themselves and not the opinions of the Institute, which we state in the fine print on our masthead. And as letters to the editor confirm, our members understand that and appreciate the chance to participate in constructive debate.

NEWS THAT'S REUSED

OdorBusters busted: "Five Truman State University students thought they had found some pretty unusual summer jobs," reports the *Kansas City Star*. Their task was to respond to complaints about odor from pig effluent at several agricultural operations owned by Premium Standard Farms in northern Missouri. But when the industry got a whiff of the idea, it was canceled.

PSF has been on the burner for pig odor for more than two decades, paying millions of dollars in fines, and the Missouri attorney general had reached a settlement requiring improvements in compliance with odor and environmental laws, but the odor continues and Missouri doesn't have the funds to enforce the law. The solution was to hire the students. The AG's office provided a $20,000 grant, and the students were deployed.

"And that's when the plan began going south," the paper opines. Literally, to the state capitol. PSF's lobbyist told some state legislators that they had concerns, and they called the college president, who closed down the program. Blocked nasal passages, no doubt.

Show me more manure: By coincidence, *E&E News,* the online service, also reports on odors from Missouri's concentrated animal feeding operations. "Farm manure may stink, but is it a hazardous substance? Not according to Missouri Rep Billy Long (R)," the news service asserts. "Long introduced bipartisan legislation that would prohibit U.S. EPA from classifying livestock manure as a 'hazardous substance' under its Superfund cleanup program."

According to the freshman solon, if EPA does put the smelly substance on the list of hazardous materials, "it would be 'just another overreaching regulation' by the agency that would 'cripple' job creation in his home state.

"It doesn't make any sense to lump tens of thousands of farms and livestock producers under the same severe liability provisions that apply to the nearly 1,300 federal Superfund toxic waste sites," Long said in a statement. In 2008, EPA largely exempted CAFOs from Superfund reporting requirements, and the Obama EPA is trying to reverse that rule.

More on farm wastes: A small note in *National Journal* reports that "the EPA will no longer classify spilled milk at a dairy farm as an oil spill, saving $146 million." The magazine wags, "No word on whether they will cry over it."

And more on pubic health: "A proposed law in San Francisco would require the city's nudists to cover public seats with a protective barrier before sitting down," reports *Slate*. "Supervisor Scott Wiener, who introduced the bill, claims that sharing bus seats, cafe benches, and restaurant chairs with naked people is a threat to public health. It's a claim that's been repeated in city ordinances and even a Supreme Court case. Does public nudity really increase the spread of infectious disease?"

Actually, we're asking different sorts of questions. Such as, do nudists really take public buses and dine in restaurants in San Francisco? Somehow this issue doesn't arise where I live nor, I suspect, in most of the country.

Stepping Stones

As diplomats meet in Durban this December seeking to move the global economy beyond fossil fuels, it is easy to forget how daunting were the tasks facing weapons and economic negotiators, who building on a grand bargain then succeeded by proceeding in small increments

Ruth Greenspan Bell is a Public Policy Scholar at the Woodrow Wilson International Center for Scholars. **Micah Ziegler** is a graduate student at the University of California, Berkeley.

Global climate negotiations take place in a stately progression of run-up meetings throughout the year, culminating in a Conference of the Parties set in late November or early December. Durban, South Africa, will host the this year's 17th COP of the United Nations Framework Convention on Climate Change, known as the UNFCCC. Predicting the likelihood of a Durban success is an eye-of-the-beholder-inquiry. No broadly encompassing, legally binding agreement to reduce greenhouse gas emissions emerged from the two previous COPs (held in Copenhagen and Cancun) and the prognosis for Durban is roughly the same. The environmental editor of *The Guardian* said that Cancun "kept the wheels on" but that the bus "is still careering towards the precipice." Of the current state of negotiations, one country official noted small advances in technical issues, but feared that without emission reduction pledges, business-as-usual greenhouse gas emissions would bring the world to very substantial warming. A peer-reviewed analysis by researchers at the Massachusetts Institute of Technology now forecasts a 1 in 7 chance of an increase of 11-12° Fahrenheit, a temperature at which survival becomes critical for human beings and ecosystems. So the challenge for policymakers is to lessen the real probability of a catastrophe.

Increasing greenhouse gas emissions and a growing understanding of climate change impacts — current and expected — stand in glaring contrast to the stalled negotiations. There is almost no uncertainty as to whether climate change is happening but scientists cannot exactly calculate when and where particular impacts will occur. For example, estimates in 2004 were that the Arctic would be ice free in the summer of 2100. Current predictions range from a decade to 30 years. A variety of other consequences are being felt, including the growing threat to species and natural resources that support agriculture. Although scientists are reluctant to attribute any specific weather event to climate change, the magnitude and frequency of extreme weather incidents seem to be increasing.

Should the world continue along the UNFCCC pathway, or should policymakers consider the possibility of additional forums or different sorts of arrangements? Is exclusive attention to the UNFCCC process throwing good money after bad, or is a comprehensive settlement of the many issues surrounding climate change the only possible way to proceed? How can the negotiating process be better matched with the urgency of the science?

One way to consider these questions is to examine the histories of other global challenges that, by their nature, require multinational arrangements. With help from Barry Blechman and Brian Finlay of the Stinson Center, and Thomas Cottier of the World Trade Institute, we looked at the quests to reduce threats to humanity from weapons of mass destruction and to improve cooperation in the international economy, and how momentum was built in those contexts and progress accumulated. Recognizing differences among the subject matter,

they suggest a means to bypass the current paralysis and possibly speed negotiations to reduce emissions of greenhouse gases.

A principal conclusion is that climate negotiators must consider a wider variety of experiences and potential routes toward managing greenhouse gases. The objective at this stage must be to consider all alternatives that might achieve forward motion and a more robust and prompt outcome. It is not necessary to decide now whether the UNFCCC should continue or be abandoned. Rather, events and successes should dictate workable pathways forward.

Some background: what is the UNFCCC trying to achieve? The default architecture (and hence current pathway) of climate negotiations was set when the UNFCCC opened for signature at the Earth Summit in 1992 in Rio de Janeiro, and entered into force with an adequate number of ratifications, including the United States', in 1994. Articles 3 and 4 set out a framework. Developed countries would "take the lead" to reduce their greenhouse gas emissions and provide support so that developing countries could embark on a sustainable pathway without sacrificing their economic development goals. The formula is "common but differentiated responsibilities and respective capabilities."

The 1997 Kyoto Protocol to the UNFCCC, which the United States signed but never ratified — indeed, President George W. Bush withdrew the U.S. signature — put flesh on these bones. Acceding "Annex I" countries — industrialized countries that were members of the Organization for Economic Cooperation and Development as it existed in 1992, plus countries with economies in transition in the former Soviet bloc — agreed to emission reduction targets. Most developing countries ("Non-Annex I") such as China and India have much more limited obligations.

Annex I countries can decide how to meet their targets. The protocol authorizes "flexible" mechanisms (essentially variations on market instruments) to expedite reductions, make them more economical, and finance sustainable development and greenhouse gas emission reductions in the developing world. Under the Clean Development Mechanism, developed countries can fund emission reduction projects in developing countries in place of making

their own reductions. Joint Implementation allows developed countries to invest in emission reduction projects in other Annex I countries, rather than reduce emissions domestically.

The jury is out on Kyoto's results. Flexible mechanisms have allowed some Annex I countries to use legal sleight-of-hand to come into compliance; for example, benefiting from the collapsed industrial sectors of the former Soviet bloc even as their own emissions increase. Canada states candidly that it will not meet its commitments. The economic rise of China and India, which have effectively become developed industrialized countries in the 14 years since Kyoto was written, was accompanied by rapidly growing emissions. And the United States elephant sitting in the corner of the Kyoto room not only continues to increase its emissions, but cannot resolve internal differences that stand in the way of reductions.

The 2009 Copenhagen Accord potentially offered a new pathway toward emissions reductions. For the first time, a significant number of world leaders attended a COP. They agreed that any interested country could unilaterally record individualized commitments, in their chosen format. The leaders also agreed to hold maximum allowable global temperature rise to no more than 2° Celsius, and to strengthen the goal to 1.5° C upon review of the science. These results were adopted by the COP itself. A year later, important elements of the Copenhagen Accord were incorporated into the Cancun Agreements, although it will take further negotiations to know if their important details can be managed, what actions will follow from these commitments, or whether agreement is a chimera.

The Durban 17th COP must consider the future of the Kyoto Protocol, which by its own terms ends its "first commitment period" in 2012, and related to that, whether to continue the current differentiation of responsibilities between Annex I and non-Annex I countries.

What can be learned from other international spheres of cooperation, mainly the weapons and economic worlds? Three broad perspectives emerge that shed new light on efforts to contain greenhouse gases.

The first is the value of finding ways to diversify negotiating and related forums and parties, rather than hoping to resolve all issues in a single grand agreement. Issues can be segmented for resolution rather than consolidated under one negotiating umbrella. The result could be a variety of bilateral, regional, and other forms of agreements among significant emitters. Political consensus building could be separated from negotiations on more specific issues. Big issues might be split into smaller ones by the nature of the problem or the proposed solutions. This might eventually lead to the development of separate institutions or forums focused on specific tasks, giving them the potential to gain experience and develop trust among participants.

In the weapons world, a broad complex of arrangements manages the component parts of the multifaceted nuclear challenge, predicated on a central bargain. Somewhat parallel to the UNFCCC bargain, countries with nuclear weapons pledged to work to eliminate them, while countries without pledged to refrain from developing nuclear weapons capabilities and received support to develop civilian nuclear energy. The Nuclear Non-Proliferation Treaty delineates the broad structure, with the Nuclear Suppliers Group and other multinational organizations assigned more specific tasks in the control of exports of nuclear materials and equipment.

Monitoring, verification, and implementation of the core bargain memorialized in the NPT have effectively — and productively — been split out to the independent International Atomic Energy Agency. The IAEA is able to keep global attention focused on to the issues of proliferation. Through the years, the IAEA has gained the confidence of countries and thereby increased the reach of its inspection function. The IAEA eventually persuaded 103 countries to sign "additional protocols" to their basic safeguard agreements, which give the IAEA the power not only to inspect declared nuclear facilities, but to conduct inspections of suspected nuclear sites on a challenge basis.

Even more interesting, although the Comprehensive Test Ban Treaty, adopted by the UN General Assembly in 1996, has yet to enter into force because certain required countries have not yet ratified it, a Preparatory Commission was established, officially on a "provisional" basis, and operates a network of hundreds of sensors to monitor compliance with the test ban treaty. Moreover, the five major nuclear powers have refrained from testing for 14 years, even though two of them, the United States and China, have yet to ratify the treaty. While it would be tidier to move forward with the

formalities, the results so far, a decade and a half free of testing by the five major nuclear powers, albeit with a few recent tests by three renegade countries — can be counted a significant success.

Diversification can also happen within a single treaty regime or negotiating forum in ways that recognize differences among the contracting parties but better accommodate changes over time. One way is to have pre-arranged stepping-stone graduation rules to increase countries' responsibilities in the course of treaty relationships, rather than being frozen in distinctions that may no longer reflect the divide between countries that can unilaterally address climate change (Annex I) and those that need assistance (non-Annex I). Graduation is being considered in the trade world as one answer to current negotiating impasses, notably the World Trade Organization's Doha Round, and has been considered in the climate world.

Finally, diversification can be a basis for innovation and experimentation to expand the tools or capability for addressing specific issues. For example, coalitions could facilitate like-minded countries' thinking jointly about productive problem solving that fits their historic ways of addressing big issues and takes account of their unique government and legal cultures. China's expression for how it managed its successful economic transition might guide this. Without a ready model for this unprecedented shift, the Chinese instead "waded across the stream by feeling the stones." The legal systems of the United States and Europe, different as they are from each other, are more comparable to one another than to the Chinese system, which historically has not been guided by written laws in the same way western democracies have. Recognizing and working

Backloaded Policies in the Fore

The single most effective way to reduce greenhouse gas emissions would be to price them through a tax or cap-and-trade scheme. The latter is of course used by the Kyoto Protocol and the European emissions trading system. However, few countries have actually priced carbon, and many continue to subsidize greenhouse gases. The wealth and political influence of fossil-fuel industries has resulted in politicians coming out with token policies that don't actually cut pollution. As a result, the world continues on its dangerous, indeed reckless, emissions trajectory.


Som Somanathan

In this situation, a policy that actually works and is politically feasible must achieve little in the short run, but a lot in the long run. Such a "back-loaded" policy exists in Germany, Spain, and a few other jurisdictions. It is the subsidization of currently expensive renewable energy technologies such as solar photovoltaic energy and complementary storage and transmission technologies.

This serves the purpose of appearing green while not being an immediate threat to the profitability of fossil fuels. Solar PV, for example, accounted for only 0.5 percent of world electricity consumption in 2010. But it has grown at the rate of more than 30 percent per year for the last 15 years, doubling every 2.3 years on average. If this growth rate is maintained for another decade by extending PV promotion policies to more countries, then in 2020, 10 percent of world electricity consumption would come from solar energy. Exponential growth results in solar becoming a substantial fraction of the total.

The cost of a nascent technology falls rapidly with deployment (about 22 percent with each doubling of output in the case of solar PV) so the subsidy bill eventually shrinks to nothing. Time-of-day pricing can be used to shift demand toward the daytime and long-distance transmission will enable sunlit areas to transmit power to those in darkness. Thus, the scenario pictured above is not implausible. An international agreement to implement policies that encourage solar and other renewable technologies would speed up the deployment and cost reductions that could make it a reality.

Reducing emissions is both important and possible. However, the world also needs to adapt to the warming that is coming. Poor and densely populated tropical countries are going to be hit hard. The most urgent need is for food crop varieties that can better tolerate heat and other extreme weather. The international publicly funded R&D effort that drove the Green Revolution needs to be repeated and enlarged. Since this is not an expensive proposition, international agreement along these lines is eminently achievable. Neither of these types of agreement requires the participation of all countries to make them work. Even partial cooperation would take us a long way.

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with a variety of distinctions might better advance progress toward greenhouse gas reductions than encouraging every country to, for example, adopt market-based approaches where the conditions for markets are lacking.

Diversification can happen interactively within the UNFCCC, or independently, consistent with the recognition articulated by International Maritime Organization head Efthimios E. Mitropoulos, that "tangible progress could be made . . . provided there is 'a paradigm shift' in attitude away from insisting that 'nothing is agreed until everything is agreed.'"

Second, the weapons and economic regimes demonstrate there are reasons to keep talking and conclude agreements, even if major powers stall or sit on the sidelines. Blechman and Finlay conclude the test ban treaty has "clearly been beneficial to global security" because it encouraged many countries unilaterally to declare moratoriums on nuclear testing, and because the international community took upon itself to establish the monitoring organization called for in the accord, as a preliminary measure. This has reinforced confidence that nuclear weapons cannot be tested clandestinely and that the treaty is verifiable. Cottier's review of economic regimes concludes that sometimes "key players only follow suit," rather than lead, as the United States did when signing on to EU-led negotiations on financial services in the WTO's Uruguay Round.

In view of the political situation within the United States, ratification of a climate agreement may be a dream in the far future. But that does not preclude making progress. The United States could make dents in its greenhouse gas emissions with or without global engagement. In the international arena, ideas could be tested out, as was the Clean Development Mechanism in Europe. Perhaps part of unlocking the vast climate challenge is to let a kind of creative momentum develop that can result from multiple intersecting efforts.

Third, both regimes show that trust does not develop instantaneously or simply because countries have agreed to agree, especially when countries are considering adjusting such sensitive governmental functions as national defense and setting tariffs. Countries' willingness to make concessions to gain the benefits of agreement, such as allowing increasingly intrusive weapons inspections or external influences in the domestic setting of tariffs, have emerged after years of interactions that permitted the growth of trust and mutual comfort-levels. Intrusive inspections in the weapons world were unimaginable in the early days of negotiation. Today, U.S. and Russian inspectors actually peer into each other's silos with radiation detectors to count warheads. To gain trade benefits, countries have agreed to place decisions traditionally determined strictly by domestic policies, such as tariffs, under external guidance and direction. Looking at the problem this way might challenge the current logic of climate negotiations that would front-load verification rules and emphasize formalities.

When a tested framework of relationships and extended communications is in place, additional benefits can be harvested opportunistically. When the Soviet Union collapsed, George H. W. Bush and Mikhail Gorbachev engineered parallel unilateral initiatives for a near-immediate, significant reduction in deployed and potentially destabilizing tactical nuclear weapons. At various points, philanthropists provided immediate resources until slower moving governments were able to organize. In one such instance, stop-gap money provided by George Soros avoided proliferation that might have resulted when suddenly unpaid Soviet weapon scientists considered shopping their skills to rogue nuclear states. Results at any point in these continuing processes may be less than ideal, but plug holes and avoid potential great harms. Some philanthropists, such as Bill Gates, see their role in climate change as encouraging markets for new technologies (and investing in them), rather than acting through their foundations, but the weapons examples identify possibilities for creative philanthropic interventions, as well as potential for additional, targeted engagement of the private sector in building workable solutions to otherwise polarizing problems.

Arrangements could include coalitions of willing, larger emitters, or actions on a regional basis, and include deliberate outsourcing of specific issues, something the UNFCCC has already done with certain issues sent to the International Maritime Organization? The result could be a series of stand-alone agreements, some of which might be consolidated at a later point within a global body like the UNFCCC. There may be reason to revisit assumptions about the necessity for formal, ratified agreements when the weapons regime demonstrates it is not necessary for all parties to formally agree to achieve levels of progress. Verification arrangements might benefit from the weapons and trade experience showing how countries are willing to allow greater intrusions into their sovereignty as their comfort grows with partners and procedures.

Taken together, the lesson is that perfection is probably impossible to achieve, but there may be ways to break the current climate impasse and either bypass or supplement the current negotiation process. Indeed, it is not necessary for the purpose of making these comparisons to characterize the weapons and economic regimes as successes or failures. They have experienced both. The world has avoided nuclear holocaust, but the five nuclear powers that existed at the time the NPT was signed are now nine, with a tenth looming on the horizon. Trade negotiations are currently stuck, as new entrants to the regime navigate the vast economic and political differences among regime participants. What is important is to stimulate a discussion about alternative arrangements that might supplement and accelerate the pace, either in the event the UNFCCC process collapses, or even if it progresses.

Finally, while world leaders have generally prioritized weapon negotiations, in economic cooperation, advocates had to work to make their concerns a high priority on the agendas of participating countries. Climate advocates would do well to position these issues in a manner that engages the attention of more powerful decisionmakers. Climate negotiations must emerge out of the environmental ghetto if any real progress is to be made. In the long-run, the climate issues will benefit as foreign, defense, and finance ministers increasingly come to understand the implications of climate change for their own portfolios and thereby help build a political demand for action. Nevertheless, the psychological hurdles are formidable; Polish Prime Minister Donald Tusk was reported to have remarked privately, when he opened COP 14 in Poznan, that he was surprised not to see a room of environmental freaks. But in the United States, recognizing its implications both for resource needs and potential threats to national security, the most enthusiastic arm of the government for energy efficiency is apparently the Department of Defense.

Admittedly, context is everything in international agreements. Comparisons between efforts to control widely varying substantive global challenges should be made carefully. Climate change may be unique among not only environmental, but also other forms of global agreement, in that efforts to address it must reach deep into the economies of virtually every country on earth; in contrast, the Montreal Protocol, an environmental agreement which is often cited for comparison, dealt with a handful of specific chemical substances for which substitutes were readily developed. Each global negotiation develops its own language and forms of communication and interaction that essentially limits its ability to consider ideas from different communities. And, as always, in comparisons, the devil is in the details, including the presence or absence of political will to jointly resolve problems.

As the world contemplates the challenges of moving the global economy beyond its dependence on fossil fuels, and managing the myriad problems of winners and losers, it is easy to forget how daunting were the tasks facing weapons and economic negotiators. Prior to the NPT, all technically advanced nations were expected eventually to acquire nuclear weapons. Knowledgeable people believed such weapons would be used routinely in wars. Both scenarios have been avoided. Since World War II, the average of (ad valorem) industrial import tariffs has been negotiated down from 40 percent to 4 percent. While the challenges surrounding climate have their own unique characteristics, it is good to be reminded that tasks that seemed formidable or even impossible became manageable.

No single negotiation encompasses the multiple economic issues on which countries interact, or the variety of challenges posed by weapons of mass destruction. Alternative forms of agreements in both areas have increased flexibility and aided the development of mutual trust. Independent verification bodies have been spun off and have gradually increased their responsibilities. Negotiated import and export tariff formulation and increasingly intrusive nuclear inspection procedures have become commonplace and accepted in the international community. Presumably, countries cede significant elements of sovereignty in return for the benefits of trade and for a safer and more predictable world.

As experience and mutual confidence has grown in these older regimes, concessions have deepened to a degree that might have been unimaginable early in their negotiations, although there are still countries that hold themselves outside the rules or, once part of the club, make it difficult for others to join. Understanding how and why this has happened could facilitate the current effort to build systems of verification for climate commitments. A variety of negotiating and agreement configurations might provide a much needed kick in the pants to push the overall climate process along. •

Foundations of Sustainability

What are the core elements of sustainable development? In the run-up to the 2012 U.N. Conference on Sustainable Development, two long-time leaders in the area, coming from countries with different levels of industrialization, put their emphasis on national governance systems

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In her seminal 1962 work *Silent Spring*, Rachel Carson presented a key question to the present generation: How can the benefits of modern society be enjoyed in a manner that avoids endangering public health and the natural resources upon which humanity's future depends? In the years since, countries around the world, with different legal systems and different levels of development, have refined and expanded this concept. The U.N. Conference on Sustainable Development in June 2012 marks the 40th anniversary of the 1972 Stockholm conference, the first major U.N. environmental conference, the 20th anniversary of the Rio de Janeiro Conference on Environment and Development, and the 10th anniversary of the Johannesburg World Summit on Sustainable Development. The 2012 event offers a propitious moment to take stock of that progress and to ask: What are the ingredients that have made for success in sustainable development in the past several decades, and how can we reinforce these factors in a world of rapid change?

The U.N. Conference on Sustainable Development will have two themes: a green economy in the context of poverty eradication and sustainable development; and the institutional framework for sustainable development. Since the 1992 Earth Summit, effective national and local environmental governance has increasingly been recognized as key to the second theme and to fulfilling sustainability aspirations. Likewise, while green economy discussions have focused on a range of issues including renewable energy, efficiency, and ecosystem services, implementation will depend on effective national and subnational environmental governance. Without good governance, neither global nor domestic aspirations can be realized.

Increasing international recognition of the importance of national and local environmental governance to sustainable development has been reflected in a variety of international instruments, including the 1992 Rio Declaration and the Plan of Implementation from the 2002 World Summit on Sustainable Development. Here, we seek to reanimate this thinking by giving greater context and detail to the precepts of national environmental governance and by pointing to the central role of such precepts to the environmental pillar of sustainable development.

There have been many efforts to address individual features of environmental governance, for example, by training environmental inspectors, prosecutors, and judges. These efforts, while quite valuable, are often isolated and can miss the importance of addressing environmental governance as a system comprising a number of inter-related and reinforcing parts. This system includes environmental laws, implementation mechanisms, accountability regimes, and institutional arrangements. Together, these elements, if appropriately resourced, provide the foundation for environmental protection and conservation of natural resources, in support of sustainable development. They are also key to the emergence of the rule of law in the environmental arena — a state of being in which there is the presence of, respect for, and observance of environmental norms. Indeed, the ingredients of en-

vironmental rule of law and effective environmental governance are virtually coterminous.

Effective national environmental governance complements efforts to improve international environmental protection mechanisms. For example, multilateral environmental agreements are typically implemented through corresponding national laws and institutions. Effective national environmental governance helps ensure that parties to international environmental agreements actually achieve the benefits those agreements are designed to provide, and it provides mechanisms for addressing national and subnational problems that do not receive the same degree of global attention. Further, effective environmental governance contributes to a level playing field for businesses operating globally and helps avoid the emergence of pollution havens, while promoting regulatory coherence conducive to investment needed for development.

Environmental laws and regulatory frameworks around the world continue to evolve in response to changing conditions. While countries differ in terms of their most acute environmental problems, their cultural context, and their governmental structure, there is significant commonality both in the challenges they face and in the governance precepts to which they have turned to address those challenges. We identify below some of the key common precepts that have emerged. These precepts should not be viewed in isolation, but as interrelated and mutually reinforcing.

Seven core precepts form a basis for effective national (and subnational) environmental governance. They apply both to efforts to protect human health and to protect and conserve natural resources. Our hope is that identifying and reinforcing these core precepts can help countries strengthen their environmental governance systems and thereby make sound, science-based decisions. Improved international coordination to strengthen national environmental governance will help forge a path toward global sustainability.

Environmental laws should be clear, even-handed, implementable, and enforceable. For governance systems to be effective, laws should provide a clear roadmap for translating general legal mandates to facility-specific requirements through such tools as implementing regulations and permits. The use of clear, enforceable language, often with reference to science-based reference points, is critical. This provides clarity to the regulated community regarding requirements and reporting protocols, facilitating compliance.

Laws and regulations should also be even-handed in their design and application, ensuring consideration of the vital interests and views of all stakeholders. This may be achieved in part through mechanisms for stakeholder input into regulatory processes before final decisions are made. In many countries, environmental law (sometimes including constitutional provisions) is increasingly constructed to reflect sensitivity to human rights and related notions of justice, equity, and poverty eradication.

A central premise of many environmental laws is that prevention is superior to remediation because some harm is irreparable, and because cleanup is more costly than prevention. A combination of technology requirements and ambient norms are used in many systems to achieve such goals. Where governmental capacity is limited, technology-based requirements can serve as a relatively straightforward first step, with ease of application and proven effectiveness. Today there are technology reference points available for most types of polluting activities. Clearinghouses to match available technologies with facility operations can aid implementation. In imposing technology requirements, care should be taken to avoid inhibition of innovation. Many laws contemplate that as programs mature, requirements should be based on ambient environmental goals, with individual interventions increasingly geared toward aligning incentives with desired environmental outcomes, often using monitoring data and other scientific information as reference points for decisionmaking and performance assessment.

Environmental laws often provide for review and renewal of standards, to provide a means of updating requirements based on new knowledge. Anti-backsliding mechanisms may also be included to promote continual improvement or at least guard against regression. Laws commonly use measures to make accountability mechanisms more efficient, such as requiring polluters to self-monitor and report violations, limiting defenses that can be raised in enforcement cases, and curbing opportunities to challenge regulatory agency decisions beyond a set timeframe. The laws must also be designed to resonate with and advance the other core environmental governance precepts discussed below. Thus, environmental laws should include clear articulation of mechanisms that ensure accountability, specify reporting and information disclosure requirements, establish procedures for stakeholder involvement, address institutional structure for program implementation, reduce the possibil-

ity of corruption, and provide for dispute resolution. Finally, it bears note that proper drafting is only the beginning. Laws that are enacted but not implemented or enforced will fail to achieve desired environmental results.

Environmental information should be collected, assessed, and disclosed to the public. Routinely making environmental information available to the public enables civil society to take an active role in ensuring accountability, reinforcing and expanding upon government accountability efforts. It also fosters community engagement and development of an environmental ethic throughout civil society, industry, and government. This precept is of course only meaningful to the extent that an active government effort is underway to monitor and assess environmental conditions and polluting activities. Systematic information collection and assessment can support review of environmental program and policy effectiveness and thereby improve performance.

Many countries have freedom of information laws requiring government disclosure of a wide range of information and limiting exceptions to promote transparency. But the mere existence of a disclosure law is only part of the dynamic; public demand, governmental readiness and capacity to manage and provide information, and procedures for resolving disclosure disputes are also needed.

In recent years, the idea of a publicly available Pollutant Release and Transfer Registry (an example being the Toxics Release Inventory in the United States) has emerged as an important tool for creating pressure to reduce pollution. PRTR systems require public disclosure of pollutant release information, often via the internet. Because of public accessibility to this information, company managers who have the power to prioritize actions to reduce pollution tend to pay more attention. Accounting for pollutant releases also exposes waste in production processes, encouraging adjustments towards more efficient materials management.

Public access to environmental compliance data reported by the regulated community or amassed by government serves many of the same goals. Generally, reported information can inform public debate and consumer behavior, and leverage competitive pressure and reputational risk as motivators. It also provides vital information to communities on pollution that may directly affect them.

Stakeholders should be afforded an opportunity to participate in environmental decisionmaking. Regulated entities and civil society should have an opportunity to engage regulators regarding rules that affect them before decisions are made as well as the opportunity to challenge government decisionmaking not grounded in science and law. A range of public engagement processes may be appropriate, depending on the type of action, timing considerations, and other factors. Communication and education efforts can

Countries around the world are developing environmental governance systems based on these core precepts

Effective Laws
Environmental laws should be clear, even-handed, implementable and enforceable.

Disclosure
Environmental information should be collected, assessed, and disclosed to the public.

Participation
Stakeholders should be afforded opportunities to participate in environmental decisionmaking.

Accountability
Environmental decisionmakers, both public and private, should be accountable for their decisions.

Authority
Roles and lines of authority for environmental protection should be clear, coordinated, and designed to produce efficient and non-duplicative program delivery.

Dispute Resolution
Stakeholders should have access to fair and responsive dispute resolution procedures.

Public integrity
Public integrity in environmental program delivery is essential to achieving environmental protection.

enhance public awareness and understanding needed for effective public participation, and can also nurture development of an environmental ethic that can serve to further intensify public engagement.

Countries increasingly pay particular attention to ensuring the poor and disadvantaged are not excluded from meaningful environmental decisionmaking, often under the label "environmental justice," which contemplates the fair treatment and meaningful involvement of all people regardless of race, color, religion, national origin, or income in the development and implementation of environmental laws and policies. It might take special efforts to reach out and engage such communities because of language, cultural differences, or economic disparities. An empowered citizenry is more apt to channel its concerns though legal mechanisms rather than through civil disobedience or other extra-legal means, and is more likely to understand and be accepting of outcomes, while noninvolvement breeds suspicion and disaffection.

Environmental decisionmakers, both public and private, should be accountable for their decisions. Effective environmental governance systems hold government decisionmakers accountable for making decisions grounded in science and law, thereby ensuring confidence in the impartiality and public purpose of their actions. Effective environmental governance systems also hold polluters accountable for compliance with environmental requirements and for remediating environmental damage. As a general rule, the polluter pays: the costs of environmental remediation should be borne by the entity that produced those costs through their polluting activities, rather than by the public at large.

Robust government enforcement mechanisms are necessarily the leading edge of the effort to deter violations and level the regulatory playing field. Compliance assistance, reporting requirements, inspections, monitoring, and administrative, civil, and criminal enforcement authorities can all play important roles in an enforcement system. Enforcement remedies include halting the violation, requiring remediation, through injunctive relief or related tools, and assessing financial sanctions. Financial sanctions must be sufficient to deter noncompliance. Unless a penalty exceeding the economic benefit of noncompliance is recovered, violators can obtain an unfair advantage over their competitors who comply.

Enforcement actions should endeavor to treat like violations in like fashion, providing a level playing field of expectation and response. Equivalent and nondiscriminatory treatment should be also afforded to national and foreign actors, and governments should ensure transparency such that improper influences are exposed to public scrutiny.

Direct citizen legal action against polluters has become an important feature in some countries. Such citizen actions can reinforce the backbone of government enforcers and complement their efforts. Direct citizen legal action can also enhance the system of checks and balances on government behavior that lacks vigilance or is not grounded in science and law.

Roles and lines of authority for environmental protection should be clear and coordinated. Roles within government should be defined and coordination mechanisms established to foster efficiency and prevent conflicting expectations. Rules and protocols are often needed to direct traffic and achieve both horizontal and vertical coherence in the division of labor between and within different institutions. This is the case whether a government system is centralized or decentralized.

Laws should specify whether environmental programs will be administered by an agency independent of other governmental programs. In some instances, regulatory functions can be compromised if they are housed together with business-enabling functions. It is important that laws define implementing agency structure to ensure that regulated community self-interest does not predominate over the implementing agency's public interest mission.

Formally structured inter-agency relationships (rather than those created on an ad hoc basis) can enhance effectiveness. Roles can be set out in laws, regulations, or other instruments (e.g., memoranda of understanding) to minimize competition and prevent conflict. Ministries with overlapping authorities in the environmental arena often develop memoranda of understanding to promote cooperation and efficiency.

When multiple levels of government are involved, effective governance necessitates a clear division of labor between national, provincial, and local levels. Which level of government has implementation primacy — for example, which level will issue pollution permits — should be clearly specified, and mechanisms should be created to address contingencies such as implementation failure by provincial or local governments.

Affected stakeholders should have access to environmental dispute resolution mechanisms that are fair and responsive. The judiciary (including, in some countries, administrative courts) plays a vital role as the guarantor of the protective benefits of environmental law. Moreover, what judges treat as important, a so-

ciety comes to judge as important. Thus, the courts' response to environmental problems can have a powerful transforming effect across society, with the seriousness of judicial attention and response projecting to the regulated community and the public at large the importance of environmental quality and the unacceptability of behaviors that jeopardize the environment. The judicial response can serve as a powerful catalyst toward the solidification of the environmental rule of law and the development of an environmental ethic — an ethic that, once it takes hold, can engender a sense of responsibility in all sectors of society, inspire citizens to think green and buy green, and encourage businesses to respond to green consumer demand and to their own emergent corporate environmental conscience.

Fair and responsive dispute resolution requires impartiality, independence, and timely review by the reviewing tribunal. In light of the irreversibility of some health impacts and environmental harms, justice delayed can be justice denied. Transparency in the dispute resolution process promotes a sense of fairness and furthers development of the environmental rule of law. These goals and faith in the even-handedness of the system are also advanced when affected persons are accorded a forum to present their claims on the public record with written resolutions that articulate the basis for a decision and are made public. Such written resolutions can also serve to educate the regulated community and affected citizens about environmental requirements and the importance of environmental protection.

Courts in different countries utilize a variety of mechanisms for dealing with the complexity of environmental cases, including special masters and other court appointed experts, strict liability standards, shifting burdens of proof to the polluter on some issues, and environmental courts. Traditional judicial prerogatives, such as invocation of the courts' coercive power to enforce judgments and their ability to maintain jurisdiction to effectuate a remedy, remain of central importance as well.

The principled and even-handed administration of justice includes producing consistent, predictable results in like cases and a financial sanction baseline that eliminates the economic benefit of noncompliance. Doing so promotes cost internalization, incentivizes compliance and eliminates market disparities between compliers and non-compliers.

Public integrity in environmental program delivery is essential to achieving environmental protection. Corrupt and unprincipled environmental decisionmaking frustrates program implementation, distorts environmental results, and erodes public confidence in the environmental rule of law. Although the health and other dividends of environmental protection generally far exceed in value the private cost of compliance, and a strong regulatory regime can encourage innovation and foster economic growth, the cost of compliance can be significant to individuals. Thus, implementing anti-corruption measures is vital to reduce the potential for graft and bribery of officials such as inspectors, enforcers, and permitting officers. Standards of ethical conduct and strong, independent review or audit mechanisms are essential, and whistleblower protections, which encourage employees to report employers' misdeeds by creating protection from reprisal, can offer a further check against improper behaviors.

Judicial professionalism, independence, and impartiality can likewise be enhanced via a code of conduct that provides for financial disclosure and, when there is a conflict of interest, disqualification. Provision for judges' financial security and protection from political retaliation can help as well in ensuring integrity.

While there have been laudable efforts in the past to enhance environmental governance, such efforts have been isolated and sporadic. What constitutes effective environmental governance has not to date been reduced to a commonly accepted set of ideas around which the world community might more meaningfully organize and mobilize. Recognition of the common precepts of an effective governance system built on the rule of law can, we believe, offer both a meaningful step in this direction and a pivotal move in the direction of sustainable development. The lessons of the past decades illuminate these precepts, which we have attempted to describe briefly in this article. Our hope is that this articulation can help catalyze an international dialogue on this topic, with the 2012 United Nations Conference on Sustainable Development perhaps serving as a watershed moment both for elevating the importance of effective national and subnational environmental governance as a key building block for sustainable development and for enhancing international engagement in the effort to build environmental governance capacity.

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Required: Environment As Well As Governance

Good environmental governance requires more than effective laws, transparency, participation, and accountability. It also requires the necessary environmental underpinnings.

The 1972 Stockholm and 1992 Rio Declarations articulated many environmental principles, including pollution prevention, polluter pays, precaution, inter-generational equity, and sustainability. These principles broadly define the fundamental ethical and conceptual framework for international and domestic environmental law.

Since their adoption, and particularly in the two decades since the 1992 Earth Summit, these principles have informed the development, implementation, and enforcement of national and international environmental law. They have guided and shaped the content of national legislation and international agreements. They have established a conceptual basis for innumerable actions at the local, national, and international levels to improve environmental management. And courts have increasingly cited them in interpreting and enforcing environmental laws.

Carl Bruch

There is a gap in the commonly accepted principles of international environmental law, however — a gap that is so obvious that it is surprising that it ever existed in the first place. Inexplicably, the existing set of principles fails to recognize a key obligation by countries and individuals: countries should take reasonable measures to avoid wasting natural resources.

This principle is a fundamental tenet of human society. Children around the world grow up learning not to waste their food, their toys, paper, and other resources. Waste is a venial sin in Catholicism (indeed, in Dante's *Inferno*, the Fourth Circle of Hell is occupied by Squanderers and Hoarders). Judaism, Islam, Buddhism, and other major religions similarly condemn wasteful actions. Legally, common law systems around the world have a well-established doctrine of waste. The Law of War prohibits laying waste to an enemy's land except in very narrow circumstances of military need; and if waste is prohibited during wartime, how could it be justified during peace?

The prohibition against wasting resources may seem to be such an obvious norm; why would it be necessary to have it be an articulated environmental principle? Then again, why is it necessary to defend legislation phasing out inefficient incandescent lightbulbs? Why does legislation allow for shrimp bycatch that often results in ten pounds or more of fish being killed and thrown back for every pound of shrimp caught? Why do countries allow an estimated 134 billion cubic meters of natural gas to be flared or vented annually? Why is there opposition to bottle bills that provide economic incentives to return and recycle beverage containers?

Why is such a principle necessary, when "sustainable development" and the other principles already exist? People may disagree on what is sustainable (after all, it is a concept that is not deeply ingrained in societies), but there is often significant agreement on what constitutes waste and that waste should be avoided.

Articulating such a principle would not remove all wasteful actions. However, an international principle against waste could help to frame legislative debates by clearly labeling wasteful measures and actions for what they are. And as such, articulating a principle that countries and the international community should take reasonable measures to avoid wasting natural resources would help to focus attention on and motivate action to address some of the most unsustainable practices.

The 1982 World Charter for Nature is one of the few international instruments that explicitly address waste of natural resources. Principle 10 provides that "natural resources shall not be wasted, but used with a restraint appropriate to the principles set forth in the present charter," and expounds on some specific ways to avoid wasting living resources, soil, water, and nonrenewables. This principle has been largely ignored by other global declarations to date. It is time to change that.

In strengthening environmental governance, particularly at the national level, it is time to consider whether the environmental principles that underpin environmental governance are sufficient. It is past time that the international community urge countries to take reasonable measures to avoid wasting natural resources. Articulation of a principle against wasting resources could support the further implementation of other existing, agreed-upon principles, such as those on sustainable development, precaution, and polluter pays. Experience in operationalizing environmental principles over the past two decades shows that principles of international environmental law are essential in guiding the development and enforcement national environmental legislation.

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The Social Cost of Carbon

Buried deep in the back pages of a minor, and seemingly unrelated, environmental regulation, the Obama administration has laid out its climate agenda. But estimating the results of greenhouse warming turns on a set of nested assumptions each of which can sway the ultimate answer

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All but dead in the U.S. Congress, climate policy has been limping along behind the scenes. The Environmental Protection Agency and other federal agencies are now taking measures to reduce greenhouse gas emissions, but those measures have more bark than bite. And the outlook for a more robust federal climate initiative is not good at all.

Here's the bark: Setting a price on carbon emissions is now the standard practice when assessing EPA, Department of Energy, and other federal regulations. If you are surprised, then you probably missed the Obama administration's seminal publication on the subject, Appendix 15A of the Regulatory Impact Analysis for its energy efficiency program for small electric motors. Squint deeply into the fine print of Appendix 15A (now reposted for your convenience on the Office of Management and Budget's website). There you will find our new national carbon price. The bite? A measly $21 per ton of carbon dioxide, or about the equivalent of $0.21 per gallon of gasoline.

Here's how to get a sense of the whether $21 a ton is big or small. The average U.S. resident emits about 21 tons of carbon dioxide every year. If the administration's carbon price were in effect across all sectors of the economy — à la Waxman-Markey, Kerry-Lieberman, and other dead-letter climate bills — 21 tons times $21 per ton would amount to $441 in extra "carbon charges" paid by each individual in each year, about 1.5 percent of the average persons' income, or $1.21 per day for each of us. Energy conservation measures would allow you to reduce those carbon charges, but only by a fraction. Would the chance to save some fraction of $441 a year be enough to make you change your behavior? Buy a hybrid? Insulate your attic? Wait for hotter temperatures before turning on the air conditioner? Perhaps. But would it change U.S. consumer preferences enough to inspire electric utilities to switch to carbon-free generation, or to provide the incentives to develop the public infrastructure needed to make electric cars a viable transportation option? Probably not.

The administration bases its carbon price on its estimate of the "social cost of carbon." That's the future damage that would be caused by emitting one extra ton of carbon dioxide. In the cost-benefit analyses required for all major federal environmental rules, a regulation (such as increased energy efficiency requirements for small motors) that would reduce emissions will now be assigned an additional $21 benefit per ton of carbon dioxide kept out of the

atmosphere, making it that much more likely for its benefits to exceed its costs. Obviously, the higher the assumed social cost of carbon, the better that environmental regulations look in cost-benefit terms.

In the field of economics, greenhouse gas emissions cause what are known as "negative externalities": damages (to someone other than the emitter) that no one is made to pay for. When federal regulations that reduce greenhouse gas emissions do not include a carbon price, it is as if federal agencies were assuming that these emissions have no negative consequences. If $21 really is the value of all future damages caused by emitting an extra ton of carbon, then including it as a benefit in the assessment of a new regulation would, as economists like to say, "internalize the externality" — as if polluters were charged for the damages that they caused or, equivalently, efforts to reduce emissions were rewarded for each ton of carbon dioxide avoided. The method has a solid pedigree in mainstream economics. The question remains: Is $21 the right price?

Appendix 15A presents a range of possible social cost of carbon estimates based on changes to several key assumptions, discussed below, but settles on the central estimate of $21 per ton. This value has made its way into subsequent federal Regulatory Impact Analyses, including evaluation of Corporate Average Fuel Economy standards. The Interagency Working Group that conducted the analysis averaged the results of three climate-economics models: the PAGE model calculated a social cost of carbon of $30 per ton; the DICE model, $28; and the FUND model, $6.

In a recent report for the E3 Network, a national group of economists, written by Frank Ackerman and myself, we took a close look at the Working Group's version of the DICE model to figure out what makes it tick. We found that the DICE model's $28 result is extremely sensitive to three choices made by the modelers regarding the discount rate, the degree of climate sensitivity, and the assumed relationship between temperature increases and economic damages.

First, the discount rate determines the importance of future costs and damages in current decisions. Climate damages from today's emission of greenhouse gases are expected to take place over the course of hundreds, and even thousands, of years. Estimating the social cost of carbon requires us to sum up all of the future damages caused by the release of an additional ton of carbon dioxide. If the discount rate is set to 0 percent, damages are simply added together, regardless of whether they occur in 2012, 2112, 2212, and so on. The higher the discount rate, the more that future damages are "discounted," or scaled down — like compound interest in reverse. At a very high discount rate, damages far off in the future appear vanishingly small and only damages that will take place in the next few years or decades are given any real weight. The Working Group's central estimate uses a 3 percent discount rate; it also tested out results at 5 percent and 2.5 percent.

A 3-percent discount rate is often recommended for U.S. government policy analysis, but then again, most policy analyses focus exclusively on impacts in the next few years or decades, not on damages that are expected to occur over many centuries, as in climate change. For climate impact assessments, the typical range of discount rates tends to be much lower than for short-term environmental policy issues. The Working Group itself notes that the widely employed "prescriptive" approach to discounting — based in part on a subjective judgment about how the current generation values costs and benefits experienced by future generations — has commonly been used to justify values as low as 1.4 percent. In the end, there is no "correct" discount rate, and the debate about it boils down to a question of ethics: How much weight should we give to future climate damages? (or, put another way, to the interests of future generations?). If the answer is "a great deal," then a 3 percent discount rate will result in an underestimate of the social cost of carbon.

Second, the Working Group's estimate rests on the assumption that greenhouse gas emissions' effect

on global temperatures is well known, when, in fact, this relationship is highly uncertain. If global emissions continue to grow at today's pace, by 2040 the concentration of carbon dioxide in the atmosphere could be twice as great as it was in preindustrial times. The effect of these emissions on temperatures begins immediately but can take a few centuries to be fully realized. Climatologists use a shorthand for the emissions-to-temperature-change relationship called "climate sensitivity," or the effect of a doubling of carbon dioxide in the atmosphere on long-term average temperatures. The higher the climate sensitivity, the higher the temperature for any given level of emissions. For example, research by the UK government suggests that today's pace of emissions growth and a 3°C climate sensitivity, which (when added to other effects) means global average temperatures 5.4°C higher than the preindustrial average by 2100; at a 6°C climate sensitivity, the same emissions would cause a 7.1°C temperature increase by 2100 — a big difference.

According to the most recent climate science research, the median, or best guess, climate sensitivity is 3°C — the value used in the administration's central estimate — but the real value is unknown (and, perhaps, unknowable) and, as the Working Group recognized, there is a broad range of possibilities. According to the Working Group's own analysis, there is about a two thirds chance that the true climate sensitivity lies somewhere between 2°C and 4.5°C, a 1-in-10 chance that it is greater than 6°C, and a 1-in-20 chance that it is greater than 7°C. Appendix 15A reports results for the 95th percentile (i.e., 7°C) climate sensitivity, but then uses only the median (3°C) value in its central estimate.

If climate sensitivity turns out to be higher than the best guess, the administration will have underestimated the correct price to place on carbon. At issue here is how best to make decisions about risky outcomes. Too low of a carbon price will mean an emissions reduction policy that offers too little too late. Should we use a carbon price with a 50-percent chance of resulting in insufficient emission reductions, or one with just a 1-in-20 chance? How about a 1-in-1000 chance for a little more breathing room between us and climate catastrophe? Again, there is no correct answer, just a lot of questions. One thing, however, is certain: Assuming a higher climate sensitivity would be a more risk-averse approach to estimating the social cost of carbon.

Third, while the Working Group picked out the discount rate and climate sensitivity behind its central estimate — tweaking the three models to follow a consistent set of assumptions — it accepted without adjustment or analysis the original PAGE, DICE, and FUND relationships between temperature increase and economic damages. Indeed, the differences in the damage assumptions used in these models account for most of the variation in their resulting social costs of carbon, from $30 per ton in PAGE to $6 per ton in FUND.

PAGE, developed by Chris Hope of Cambridge University and used in the well-known and well regarded Stern Review of the effects of climate change, includes the potential for catastrophic impacts in its damage estimates, but (outside of the Working Group's analysis) is designed to be run "Monte Carlo" style: averaging the results of running the model thousands of time at different climate sensitivities and other uncertainties, drawn randomly from a pool of values that is based on their expected probability. The administration's central value for the social cost of carbon includes only PAGE results using the median 3°C climate sensitivity.

The FUND model, developed by Richard Tol and David Anthoff, produces a social cost of carbon that is far lower than the other estimates. Multiple critiques of the model attribute its anomalous results to an out-dated representation of the physical dynamics of climate change (resulting in lower temperatures for the same emissions compared to other models) and the use of obsolete assumptions regarding the benefits of climate change to agriculture. In direct contradiction to the body of recent scientific literature, the FUND model assumes that climate change will not only bring a net increase to agricultural revenues, but that this increase would swamp climate damages in other sectors.

The DICE model, developed by William Nordhaus at Yale University, was the focus of our E3 Network research into the Working Group's methodology. It is the best known of the three models, and the easiest to modify. At $28 per ton, the DICE model assumes that a 2.5°C increase in temperatures will result in damages equal to 2 percent of world economic output. As temperatures rise even higher, damages increase at a leisurely pace, not reaching half of world output until 19°C.

This picture of future climate damages is hard to reconcile with the recent publications of climate scientists. To give just one example, scientists have

found that the majority of today's global population lives in areas that, if temperatures were to rise by 12°C, would experience temperatures too high for human survival at least once a year; without air conditioning, an impossible luxury for most families around the world, much of the developing world would be rendered uninhabitable. One estimate of nearer term damages put the cost of a 2.5°C rise in temperature at 7 percent of world output; another estimate suggests that half of world output would be lost at 6°C, and 99 percent at 12°C.

The DICE model's overly optimistic assumptions about the economic impacts of temperature change result in an underestimate of the social cost of carbon. As with the discount rate and the climate sensitivity value, we cannot know the exact dollar impact of future temperature increases, but we can make educated guesses based on the best, and most recent, scientific research available. The Working Group's analysis fails to do so and, when EPA (and other federal agency) regulation of carbon is the only game in town, the consequences for U.S. climate policy are grim.

The $21 per ton carbon price is based on a high discount rate, a low climate sensitivity value, and a conservative temperature-to-damages relationship — all modeling choices that lower the social cost of carbon. Trying out different combinations of the alternate assumptions discussed above results in estimates for 2010 that ranged from the original DICE model estimate of $28 per ton of carbon dioxide to $893 per ton. Taking these changes singly: Dropping the discount rate from 3 percent to 1.5 percent brings the social cost of carbon up to $118 per ton. Replacing the median climate sensitivity with the 95th percentile climate sensitivity brings the original value up to $56. And assuming that global damages will be 7 percent of output at 2.5°C, 50 percent at 6°C, and 99 percent at 12°C also brings the price up to $118. Making all three changes simultaneously, the result is a social cost of carbon of $893, or 32 times higher than the Working Group's central value for the DICE model.

While DICE, as used by the Working Group, returns a $64 social cost of carbon for 2050, estimates based on various combinations of the alternative assumptions presented here range up to $1,550. With a social cost of carbon that high, EPA regulations that include greenhouse gas emission reductions would have a far greater chance of approval. Carbon prices above $1,000 per ton are rarely discussed in policy circles, in part because lower prices would be more than sufficient to solve the climate problem if applied to all economic sectors throughout the world. Carbon prices in the $200 to $500 per ton range would, according to the International Energy Agency, the British government, and several independent research groups, provide sufficient incentive for the maximum emission reductions considered technically feasible — basically, doing everything possible to stop climate change as quickly as possible.

Once carbon prices are this high, the exact price no longer matters; price incentives and cost-benefit analysis have become fully precautionary, urging full speed ahead on emission reduction. A precautionary response to climate change — or to any uncertain but potentially catastrophic threat — calls for every possible measure to be taken to limit the risk of severe damages. That's also the meaning of any social cost of carbon greater than $500. When the benefit of stopping climate change is greater than the cost of emission reduction, the best course of action should be obvious: everything that we can do, as quickly as we can do it.

Here's another way to think about it. The carbon price represents the value that we, as a society, place on averting the worst climate damages. A $21 price says that we're not too concerned about it: the problem seems fairly small and most of its costs will be borne by future generations (we've got enough of our own problems without worrying about theirs). A $200 or higher carbon price sends a very different message, and would result in a very different outcome. A social cost of carbon that high would mean approval for just about any feasible and reasonably efficient EPA or DOE policy to reduce greenhouse gas emissions. If applied world-wide in every economic sector, a $200 to $500 per ton carbon price would provide enough incentive to bring emissions down to levels consistent with a 50/50 chance of keeping long-term temperatures under 2°C — a widely cited threshold for avoiding dangerous climate change.

A $200 or higher carbon price is the kind of bite that climate activists are striving for; a $21 social cost of carbon is a bark, certainly, but it lacks teeth. Buried deep in the back pages of a minor, and seemingly unrelated, environmental regulation, the Obama administration has laid out its climate agenda. Observers of the climate policy debate will recognize the $21 per ton value as far too little, while hoping that it is not too late for a serious emissions reduction policy backed by a big, loud carbon price — a social cost of carbon that shouts to the world that the United States government takes climate change seriously. •

Note to The Next Generation

The President Emeritus of the American Law Institute pens a personal missive to the rising stars of environmental protection. His message is a hope that they will succeed where the founding generation failed — in addressing the foremost challenge of our era, climate change

As prospective environmental decisionmakers and advisers, I envision you coping with a changed and changing climate. I was once cautiously optimistic about seizing opportunities to provide a sustainable future for our descendants and the species with which we share our planet ("At Long Last, Some Action?" May/June 2009). Although our generation failed to do so, I remain hopeful that yours will make the best of the remaining opportunities. You can play a critical role whether you enter public or public interest service or private enterprise.

The challenges will be particularly difficult given the disastrous consequences that we could have mitigated: drastic weather events, from scorching incessant heat to ferocious storms; frequent and raging wildfires; drought, famine, and ensuing massive movements of climate refugees; rising sea levels; ocean acidification and decreased capacity to sustain fisheries and coral reefs; topsoil disappearance, deforestation, and land desertification; shortages and degradation of fresh water; glacial melting; loss of biological diversity; ozone depletion; acid rain; excess nitrogen; toxic pollutants; and disease and pestilence.

We did not fail for lack of relevant scientific information. There was overwhelming consensus among scientists and environmentalists that a major effort should and could be undertaken now. Informed, persuasive, and eloquent leaders demonstrated that climate change confronted civilization with a crisis that we could have addressed, and that we had a responsibility to future generations.

The priority challenge is carbon dioxide. Cogent reports, speeches, and legislative testimonies addressed it. Solutions were feasible, although not easy. Our generation not only failed the challenge it also neglected to meet easier challenges, for example, black carbon (essentially soot and particulate matter), which (along with methane), was just behind carbon dioxide emissions as a major contributor to global warming.

Black carbon is formed by incomplete combustion of fossil fuels, biofuels, and biomass. It absorbs light, traps radiation, contributes to increased temperatures, accelerates glacial melting, and disrupts precipitation patterns. Unlike carbon dioxide, it has a short atmospheric lifetime. Mitigating it could produce immediate beneficial effects, slow the rate of climate change, and buy time for longer-range responses to the challenge of carbon dioxide emissions. The United States contributes only

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about eight percent of global black carbon emissions, primarily from diesel engines, and has made some attempt to address this problem. The majority of black carbon emissions come from Asia, Africa, and Latin America, much of it from home cooking stoves. Available control technologies exist to provide cost-effective reductions. The EPA's recent assessment, in a draft report to Congress, is shared by the United Nations Environment Program, the UNEP/World Meteorological Organization, the Convention on Long Range Transboundary Air Pollution, the Arctic Council, and scientists and scholars.

"It would be presumptuous to suggest 'words of wisdom.' I can only suggest that education, organization, and ethical principles are keys."

Neither the United States nor other countries have yet overcome even this relatively simple global challenge. Perhaps you will while also addressing attendant policy and ethical issues; for example, whether tackling black carbon will give carbon dioxide emitters an excuse to delay preventive measures and become just another way of shifting to the poor the burden of long-range problems caused by the rich.

What were we thinking? We debated whether and how to "discount" the future, ending up treating our descendants as ciphers and damaging our shared environment. Apart from valiant work by environmentalists, no public guardian for unborn generations worked in congressional rooms and corridors against subsidies and deals for industrial polluters. Even now, powerful interests aim to wreck existing environmental safeguards and disable the Environmental Protection Agency. While ethical perspectives develop, maybe you will give renewed attention to our descendants. Our duty "bids us restrain an unprincipled present-day minority from wasting the heritage of these unborn generations," as Teddy Roosevelt urged almost a century ago.

Why did we fail? Three key reasons are the breakdown of our political system, human frailty, and citizens' unwillingness to act.

The social compact (under which government takes responsibility for major societal problems that individuals cannot address alone) was broken: Congress was dominated by the "carbon club lobby." Many congressional leaders and other members took their money, tolerated or even encouraged their disinformation campaigns, denied truth and science, and consequently degraded the present and future environment. They were influenced, not by what they could do for the country and future generations, but by money and power. Successive presidents and congresses were ineffectual. They neglected the environment, did not provide adequate leadership, and often capitulated to anti-environmental interests. The court system was not organized to address major problems such as climate change, and even the Supreme Court, charged with upholding the law of the land, could not be counted on to recognize the standing of environmental plaintiffs to enforce the laws or to uphold a statute aimed at preventing corporations from infecting the election process with their money.

Some exceptional leaders emerged in a few states, counties, and cities but their influence was limited. Some far-sighted companies initiated developments in clean energy, fuel economy, and the use of renewable resources. On the other hand, in large part because of governmental failure to regulate and foster a fair market, some companies abandoned or deferred potentially worthwhile projects such as a public utility carbon capture plant.

Individual citizens mainly were bystanders, naively assuming that someone else would act ("the bystander effect"), or simply not caring or feeling helpless. They had weathered a major economic downturn and were trying to keep or find a job, stay out of bankruptcy and home foreclosure, and cope with the pressures of modern life. In some countries, drought and famine were already so severe that millions starved and many died. Many people were weary of crises, having spent much of their lives under the threats of nuclear attack or terrorism. Many did not consider the potential impact of climate change on national or international peace and security. Many assumed naively that technology would solve the problems, perhaps with nuclear power or some novel method of geoengineering. They discounted risks such as the enormous half lives of various radioactive materials (for example, approximately 24,000 years for the plutonium isotope PU-239) or the deleterious effects of hydrofracking for natural gas.

It is human nature and a necessity to consume resources to survive. It is human frailty and not a necessity to do so unsustainably. We became so preoccupied with meeting daily demands and enjoying occasional diversions that we paid inadequate attention to future generations or even the present misfortunes of others. Too many Americans became inured to governmental lawlessness, torture, warrantless surveillance, and depletion of our resources in foreign wars; acceded to financial bailouts of banks and financial institutions, tax cuts for the wealthy, and the widening gap between the af-

fluent and the impoverished; stood by impassively when genocide and death by starvation occurred in other countries; could not be impelled even by disastrous oil spills in oceans and rivers to take effective political action; would not stop polluting despite the appalling sight of the Pacific garbage patch or the largest wave of species extinction since the dinosaurs were wiped out; and were indifferent to basic civic principles such as voting and judicial independence. How could you expect such people to think about preventing harm to unborn generations when they were not even capable of preventing harm to themselves?

Some people chose neither to be informed nor involved. They were like the person who, when asked if he knew the difference between ignorance and apathy, responded, "I don't know and I don't care."

Americans have always been a self-reliant and resilient people. We once could confront virtually any challenge to living freely and decently. In World War II, in less than four years, we found common purpose to defeat a common enemy. In the struggle to secure civil rights, we have made slow but real progress. During the Vietnam War, protests took many years but we finally turned public opinion, and political leaders and the government were persuaded to end the war. Each of these three efforts depended on the collective and individual responsibility of citizens.

Another recent example is encouraging, although regional and not national or global: In the Pacific Northwest, starting about 15-20 years ago, the debate began to shift from "jobs versus owls" to "old jobs versus new jobs." Like other industries extracting natural resources, the timber industry dominated the early debate. The spotted owl became a rallying symbol for environmentalists and a hated one for the timber industry. When, for example, a majority of voters in the State of Washington realized that clearcutting forests resulted not only in ending logging jobs but also in silting streams, ruining salmon fisheries, endangering species, harming tourism, and making their state less inviting to new employees, they helped bring about change. They must continue to be vigilant.

Someday, Americans, perhaps even those in coal industry states, may awaken to the possibilities that green technologies and other opportunities that attend an effective program to mitigate and adapt to climate change will improve life in the short run as well as the long. With intelligence and good fortune, maybe you will have a chance to develop these possibilities in a way that will help the environment as well as foster your institutional and client interests, whether public or private.

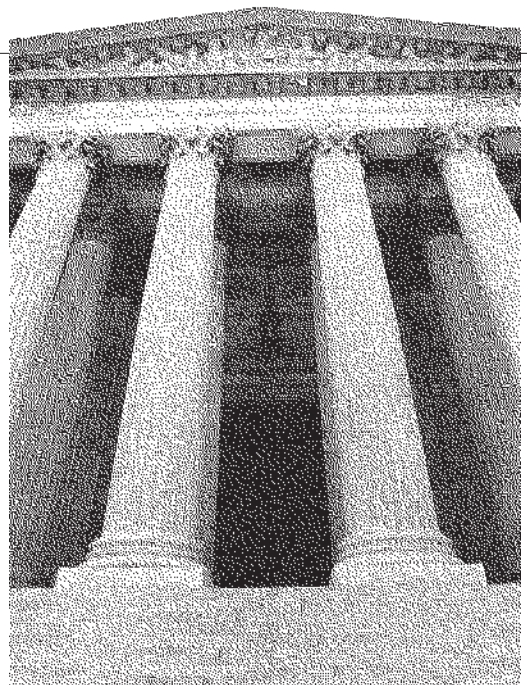
Unfortunately, we did not awaken as a united people to address the overwhelming challenge of climate change effectively. As in World War II, we had a common enemy, the combined forces of greed, corruption, and deception; and we could have agreed on a common purpose, to protect our generation, unborn generations, and the health of our planet. But we also had a daunting threshold challenge: Instead of simply supporting government and our troops, we needed to change the way government operates. We did not as citizens inform and organize ourselves to elect legislators and executives who would respond to us and not to industry lobbyists.

Even though the challenge was urgent, most people were not yet persuaded. Apocalyptic words were not effective to cause people preoccupied with varied stresses to pay attention to climate change and may even have even fostered alienation, denial, and hostility.

We were not wise, responsible, or caring enough to address the challenges adequately. We failed to achieve the moral consensus that is necessary to reach what Rabbi Jonathan Sacks described as the "covenant of human solidarity." It would be presumptuous to suggest "words of wisdom." I can only suggest that education, organization, and ethical principles are keys. They can lead to the formation of sensible public opinion, political organization, and constructive governmental actions. This process cannot be finished in a short time but you have the opportunity to begin it, while making decisions and advising clients intelligently, ethically, and effectively.

"You have the opportunity to begin the process, while making decisions and advising clients intelligently, ethically, and effectively."

Although my assessment is bleak, I encourage you to work to change our present system. Change may come sooner than you might expect. For example, I did not expect the Berlin Wall to come down during my lifetime but it did, over twenty years ago. A growing number of people want to do something useful about climate change through their own behavior and collectively. Reality is sinking in. Perhaps citizens may become motivated earlier than I imagine to elect representatives who will act in the public interest and help us unify to protect our environment. Perhaps countries might reach consensus on addressing the black carbon problem and then the carbon dioxide problem. You still have a crucial opportunity for leadership. •



THE FORUM

The Perchlorate Debate: Is the Chemical Worth Regulating?

Perchlorate is a chemical that occurs naturally in the environment and as an industrial contaminant, chiefly from rocket fuel, fertilizer, and bleach. It can have an adverse effect on the ability of humans to uptake iodine into the thyroid, and fetuses and young children are especially sensitive. The science on perchlorate's occurrence and potential human health effects is relatively robust but is complicated by several other naturally occurring substances in food with the same effects.

In 2008, the Environmental Protection Agency looked at the available data and concluded that regulating perchlorate under the Safe Drinking Water Act would not present a meaningful opportunity for health risk reduction. The agency is charged with regulating five new pollutants a year under the act, and the Obama EPA has pledged to add 16 chemicals to the list. Last February, the agency looked at the same data and concluded that regulating perchlorate as a drinking water contaminant would indeed lead to meaningful health risk reduction. The next step is to set a Maximum Contaminant Level that will be permitted in drinking water systems.

Clearly, the science and policy surrounding perchlorate regulation is complex, with several different plausible interpretations. In this issue we present a number of views on how EPA might chart a path forward, and the many obstacles to success, as it seeks to establish a perchlorate drinking water standard.

"Regulating perchlorate as a drinking water contaminant is not an efficient way to safeguard public health."

Gail Charnley Elliott
President
HealthRisk Strategies

" A stand providing meaningful health protection would hardly require the resources it took to send rockets to the moon."

Thomas E. Cluderay
Assistant General Counsel
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"Now that EPA has decided to regulate, the choice of a safe concentration in drinking water, is likely to be controversial."

Michael Dourson
President
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"EPA's inspector general has determined that perchlorate is only a minor contributor to thyroid iodine deficiency."

George Gray
Director, Center for Risk Science and Public Health
George Washington University School of Public Health

"EPA's determination to regulate is not supported by science and is contrary to the requirements of the statute."

Tom Roberts
Member
Van Ness Feldman, P.C.

"EPA determined that the chemical may have an adverse effect on the health of persons by inhibiting the transport of iodide."

Nancy Stoner
Assistant Administrator, Office of Water
Environmental Protection Agency

Not an Efficient Way to Protect Public Health

GAIL CHARNLEY ELLIOTT

Regulating perchlorate as a drinking water contaminant is not an efficient way to safeguard public health. There have been no actual reports indicating that perchlorate exposure has harmed public health or interfered with fetal or infant development. That possibility has been hypothesized because perchlorate, like many other substances, competes for the uptake of iodine by the thyroid gland. The weight of scientific evidence indicates that current environmental perchlorate levels are highly unlikely to pose developmental or other health risks for pregnant women and infants with adequate dietary iodine.

Iodine is required to maintain healthy thyroid hormone levels, which help regulate normal development. Perchlorate and other naturally occurring substances that compete with iodine to potentially affect the production of thyroid hormones are easily counteracted by adequate dietary iodine. Homeostasis assures that levels of thyroid hormones sufficient for the body's needs are maintained, even in situations with reduced levels of available iodine. According to a National Academy of Sciences report on perchlorate, "Compensation for iodide deficiency or other perturbations in thyroid hormone production . . . is the rule." The report concluded that long-term, sustained exposure to more than 30 milligrams of perchlorate per day — 600 times EPA's safety limit — would be required to produce adverse thyroid effects in healthy adults. The average daily intake of perchlorate in the United States is 10,000 times lower than that, although some people — especially pregnant women — may consume ten times more than the average amount. It is not "healthy adults" who are of concern, however. The people of concern, and the target of perchlorate regulation, are iodine-insufficient pregnant women and infants.

Since the 1970s it has been standard practice throughout the world to screen babies at birth to determine whether their thyroid glands are functioning as they should. Such testing assures prompt intervention should an infant lack adequate thyroid hormone levels and is aimed at avoiding developmental problems attributable to inadequate thyroid function. In addition, although iodine is not a required component of prenatal vitamins, most do include it. Centers for Disease Control data indicate that about seven percent of pregnant women in the United States are iodine deficient; however the same data also show no differences in thyroid hormone levels when iodine deficient women are compared to iodine-sufficient women.

EPA concluded in 2008 that regulating perchlorate as a drinking water contaminant did not present a meaningful opportunity for public health protection because fewer than one million people were likely to be exposed to perchlorate in their drinking water above the level of concern and, of those, only about 30,000 are likely to be pregnant at any given time. In contrast, the 2011 decision to regulate perchlorate as a drinking water contaminant was based on the conclusion that almost 17 million people are potentially exposed to perchlorate levels in water above the level of concern.

The difference is attributable to the use of different methods and assumptions. The earlier decision used different quantitative methods to estimate the effects of various perchlorate exposures than did the later decision, different assumptions about how much pregnant women and children eat and drink, and different levels of concern. Neither decision explicitly considered iodine status and, interestingly, recent studies have found no effect of perchlorate on thyroid hormone levels even in pregnant and non-pregnant women with low iodine status.

Meanwhile, complicating attempts to regulate perchlorate is the fact that perchlorate exposure does not occur in isolation from exposure to other substances that also compete with iodine, particularly nitrate and thiocyanate. Such substances are ubiquitous in the diet and occur in such quantities and with such potencies that determining the additional contribution to risk made by small exposures to environmental perchlorate is potentially impossible. Perchlorate itself has been detected in all foods tested. The question then becomes one of whether regulating perchlorate as a drinking water contaminant — while ignoring perchlorate, nitrate, and thiocyanate exposure from food and other sources — is likely to protect pregnant women and infants with inadequate dietary iodine.

The answer is no. Regulating perchlorate in drinking water will not have a detectable impact on public health. Public health measures aimed at ensuring adequate dietary iodine and thyroid hormone function during pregnancy and childhood might have a detectable impact on public health, for reasons that go way beyond perchlorate exposure. Such measures are, sadly, not within EPA's regulatory purview. When EPA is the hammer, every chemical looks like a nail, because that is the only tool EPA has available to fulfill its statutory mandates to safeguard public health.

Gail Charnley Elliott is President of HealthRisk Strategies.

Hardly Rocket Science: The Case for Regulating

THOMAS E. CLUDERAY

The Environmental Protection Agency has spent more than a decade reviewing the safety of perchlorate, a common ingredient in rocket fuel and persistent drinking water contaminant. By now, the record offers compelling evidence that perchlorate is a thyroid toxin linked to a host of potential adverse health effects.

On the question of whether that makes perchlorate "worthy of further regulation," the answer must be a resounding yes. The EPA has decided to revisit a 2008 decision under the Bush administration not to regulate this contaminant, and should now act expeditiously to develop a national drinking water standard for perchlorate. Doing so will go a long way toward protecting public health, particularly of vulnerable populations.

We understand perchlorate's health effects far better today than in the late 1990s, when EPA began reviewing the chemical under the Safe Drinking Water Act. Perchlorate can alter levels of thyroid hormones that are essential to proper development of fetuses and infants and to good health in adults. A groundbreaking study by the Centers for Disease Control and Prevention showed that even low doses of perchlorate — 3 parts per billion in drinking water — may interfere with normal thyroid functioning. Other studies show that fetuses and young children are particularly susceptible to the chemical and that thyroid hormone disruption can lower IQ levels and impede motor skills. In view of this, only a cynic would deny perchlorate's potential to harm public health.

We are exposed to perchlorate through food — certainly a source of concern — and also through drinking water, a significant source of exposure. Recent tests indicate that between 5 million and 17 million people in the United States are served by public water systems with perchlorate contamination. Several states have taken important steps toward addressing this problem. In 2006, Massachusetts set a robust drinking water standard for perchlorate of 2 ppb. And just this year, California proposed to lower its public health goal for perchlorate from 6 ppb to 1 ppb to account for new data showing increased risk. However, the chemical's widespread presence in drinking water means that only a national standard will ensure that all segments of the population are protected.

Fortunately, the Safe Water Drinking Act provides a vehicle for closing those gaps. For more than 30 years, the act has given EPA the authority to safeguard U.S. drinking water — something Congress has long deemed "essential to the protection of public health." So far, the agency has used the law to promulgate standards for more than 90 contaminants. Perchlorate must be next. Like the pollutants already subject to national standards, perchlorate poses significant health risks and is common in drinking water at levels of concern. That is why I was delighted to hear EPA Administrator Lisa Jackson voice her commitment to reevaluating perchlorate in early February. As the agency pushes ahead, I urge it to follow California's lead and set a standard that is feasible and provides adequate health protection — such as 1 part per billion.

Some of those who favor perchlorate regulation have proposed that policymakers focus on exposures through food before tackling the issue of drinking water. I recognize that policy solutions often have to address multiple fronts to generate meaningful results. In my view, however, setting a drinking water standard is the most feasible first step in regulating perchlorate to protect public health.

The Safe Water Drinking Act created a national framework that has been tested over time to deal with contaminants of rising concern. Public water systems already must follow federal standards for dozens of other contaminants, and they are in the best position to reduce perchlorate exposures in an effective, uniform manner. In contrast, addressing perchlorate exposure via food would necessarily involve a number of additional, much more complicated considerations, including how to treat soil contamination, irrigation water, and fertilizer, which all contribute perchlorate to our food diet.

When it comes to perchlorate, we are no longer at the frontiers of regulatory science. That is why I join my colleagues at Environmental Working Group in applauding Administrator Jackson for assessing again whether to set a national drinking water standard for perchlorate. Establishing such a standard would result in meaningful health protection and would hardly require the resources it took to send rockets to the moon.

Thomas E. Cluderay is Assistant General Counsel of the Environmental Working Group in Washington, D.C.

Newer Science Serves as a Guide to Maximum Levels

MICHAEL DOURSON

As analytical chemistry has improved, perchlorate from human and natural sources has been increasingly found in drinking water and other environmental media. The Department of Defense and others have invested a significant amount of time and treasure into understanding this exposure and perchlorate's health effects. Now that EPA has decided to regulate perchlorate in drinking water, EPA's choice of a regulatory Maximum Contaminant Level, or safe concentration of perchlorate in drinking water, is likely to be controversial.

But this does not have to be so.

The level at which the MCL is set depends on a number of factors, chief among which is often the amount of perchlorate that EPA thinks can be safely consumed daily for a lifetime, even by particularly sensitive people; this amount is known as a "reference dose." The choice of perchlorate reference dose hinges on the studies most relevant to protecting public health, particularly the health of people identified as those most likely to be sensitive to its effects. The National Academy of Sciences has identified pregnant women and newborns as those potentially most sensitive. EPA's current reference dose is based on the academy's calculations, which relied on a study performed in healthy adults, adjusted mathematically to account for the fact that the people of greatest concern are not necessarily the "healthy adults" upon whom the data were derived. That reference dose is six years old.

Fortunately, newer studies now exist that provide better information from which to derive a reference dose. One of these newer studies, performed in Chile, gives definitive information on perchlorate's likely critical effect (or its absence) in numerous pregnant women and newborns.

Specifically, Tellez and coworkers performed a prospective epidemiologic study among pregnant women from three cities in northern Chile with high, medium, or low levels of perchlorate in their public drinking water. Those investigators tested the hypothesis that long-term exposure to perchlorate may cause iodine deficiency in either the mother during gestation or the baby at birth. Iodine is critical to normal thyroid gland function, which in turn is critical for normal fetal and infant development.

The study found no changes in thyroid-related hormones due to perchlorate in drinking water. Birth measurements, such as weight, length, and head circumference, were not different among the three cities and were consistent with current U.S. norms. All of the women's iodine levels were intermediate between values reported for pregnant women in the United States, and within current World Health Organization recommendations. Moreover, breast milk iodine was not decreased among women with detectable perchlorate exposure.

Because this study measured perchlorate levels and potential effects in individual subjects in a prospective manner, it can be reliably concluded that perchlorate in drinking water up to the highest levels studied of 114 micrograms per liter — many times higher than several U.S. state standards and over four times higher than EPA's reference dose — does not change human maternal thyroid function nor important birth parameters in their babies.

Other newer studies may be useful. In fact, studies performed evaluating perchlorate exposure during pregnancy and thyroid hormone levels in newborns have demonstrated no relationship between perchlorate exposure and thyroid hormone levels. For example, a study of pregnant women participating in the National Health and Nutrition Examination Survey showed no relationship between thyroid hormone levels and urinary perchlorate, even in the low-iodine women.

A study in Israel of hormone levels in babies born to mothers exposed to very high levels of perchlorate in their drinking water (95 to 340 micrograms per liter) during pregnancy found no differences when compared with women consuming drinking water with low perchlorate levels. A study in Nevada found no difference in thyroid hormone levels when newborns in Las Vegas, where perchlorate was detected in drinking water up to 15 micrograms per liter, were compared to those from Reno, with no detectable perchlorate. A study of women in Wales and Italy evaluated thyroid hormone levels in low-iodine-status pregnant women during the first trimester, when the fetus is thought to be most influenced by thyroid hormones, and found no effect of ubiquitous perchlorate exposure.

Thus, a substantial body of data now exists showing no effect of perchlorate exposure on maternal or neonatal hormone levels or on indices of fetal growth, with some studies measuring even over 100 micrograms of perchlorate per liter of drinking water. Also, data now exist showing no effect of perchlorate on thyroid hormone levels in pregnant and non-pregnant women with low iodine status. As EPA and others debate the value of the national MCL for perchlorate in drinking water, a reference dose based on studies of potential effects in pregnant women and children — not on studies of adult men and non-pregnant women — is now possible.

And it should be demanded.

Michael Dourson is the President of Toxicology Excellence for Risk Assessment, an independent and nonprofit risk assessment research and development corporation.

The Challenge of Cumulative Risk Assessments

GEORGE GRAY

Is regulating perchlorate in drinking water a good way to improve public health? A cumulative risk assessment — which combines multiple factors that may lead to an adverse health outcomes — can help answer that question, but it can also raise many more.

Researchers and legislators are eager to see EPA use this tool. Two National Research Council reports have given advice to EPA on conducting cumulative risk assessments. Language requiring it has appeared in TSCA reauthorization bills. The agency's Children's Health Protection Advisory Committee "recommends that EPA consider cumulative exposures and stressors such as socioeconomic and nutritional status."

Ideally, cumulative risk assessments will help answer questions about combined effects of diverse chemical agents, as well as combined effects of chemical and nonchemical stressors like stress, diet, or noise. It will also address concerns about disproportional risk burdens in disadvantaged populations. And it will provide community-based evaluations of pollution impacts. The question that has not been confronted is how these analyses are to be used. Can they be used in the regulatory arena or are they really public health tools that help us identify the key sources of risk and most effective interventions for a population?

The outcome of a cumulative risk assessment conducted for perchlorate is instructive. The potential risk from perchlorate comes from its ability to block the uptake of iodine into the thyroid gland. Iodine is used by the thyroid to make a number of hormones, and sufficient iodine levels are essential for fetal brain development. Low dietary intake of iodine has long been known to be a risk factor for thyroid dysfunction (that's why we iodize our salt), and the compounds thiocyanate, nitrate, and perchlorate can all block iodine uptake. Thiocyanate and nitrate are naturally found in foods like green leafy vegetables, and cigarette smoking leads to thiocyanate exposure.

Last year, EPA's Office of Inspector General released a report that included a cumulative risk assessment for stressors that reduce thyroid gland iodine levels and potentially put developing babies at risk. The study combined estimates of exposure to thiocyanate, nitrate, and perchlorate as well as iodine intake to identify the key contributors to the risk of low thyroid iodine levels and its sequelae.

The study found that perchlorate in drinking water was only a very minor contributor to the risk of thyroid iodine deficiency. Instead, insufficient iodine in the diet was determined to be the "dominant and principal" contributor to this public health concern. Consumption of thiocyanate and nitrate in food and water were of some concern, especially in populations with low iodine intake. Ultimately, EPA's inspector general opined, "Potentially lowering the perchlorate drinking water limit from 24.5 ppb to 6 ppb does not provide a meaningful opportunity to lower the public's risk." This directly addresses a key decision EPA must make under the Safe Drinking Water Act.

So how should this information be used? If cumulative risk assessment tells us about key contributors to risk and the benefits that could come from addressing them, it would appear from the IG report that little gain would come from perchlorate regulation. Other public health interventions, primarily increasing iodine intake by pregnant women, were identified as doing much more to ensure healthy levels of iodine in the thyroid and healthy babies. Yet many of these actions fall outside of EPA's regulatory mandate. Should they be considered? Should EPA act on a very small part of the problem because that is where it has authority? Should other agencies be expected to rely on EPA analyses and act (and vice versa)? It is clear that when properly done cumulative risk analyses will reveal multiple factors influencing health outcomes that cross traditional boundaries of agencies and agency offices – if they fall within the regulatory system at all. Little thought has been given to ways to decide which, if any, are appropriate targets for action.

It is clearer how cumulative risk assessment can be used in public health applications. Knowing how various factors — including chemical exposures, lifestyle choices, diet, and psychosocial stressors — interact to cause specific diseases can help us identify the interventions that provide the greatest public health gains for out investments. The solutions may be regulatory but are more likely to involve other public-health tools, such as social marketing campaigns, technology dissemination, and community outreach.

The example of perchlorate shows that those researchers and legislators eager to see it put to use need to think not only about how to do cumulative risk assessment, but also how to use it.

George Gray is at a professor in the Department of Environmental and Occupational Health and Director of the Center for Risk Science and Public Health at the George Washington University School of Public Health and Health Services.

Ignoring Authoritative Science

TOM ROBERTS

EPA's Regulatory Determination on Perchlorate, issued last February, concluding that perchlorate should be regulated under the Safe Drinking Water Act is not supported by well-established science and is contrary to the explicit requirements of the statute.

In 2005, the National Academy of Sciences determined that perchlorate has no measurable effect on the adult human body at a level equivalent to 245 parts per billion (ppb) in drinking water. The NAS further determined that 24.5 ppb perchlorate in drinking water — a 10-fold safety factor from the no observed effect level — would be safe for even the most sensitive populations. Subsequent studies have confirmed the NAS conclusions, specifically with respect to developing fetuses and newborns.

Perchlorate — a naturally occurring and man-made salt used in military, aerospace, and industrial settings — is one of the most studied chemicals under regulatory review. It has been the subject of more than 60 years of research, beginning with its worldwide use as a prescribed drug to treat Graves' disease. It is precisely because perchlorate has been so extensively studied that its lack of health effects at environmental levels is so well understood.

Perchlorate is known to inhibit iodide uptake, an effect which NAS scientists have concluded is non-adverse.Perchlorate is one of three common compounds known to have this non-adverse effect.The other two, nitrate and thiocyanate, each occur naturally in many of the foods we eat. Together these two compounds account for more than 95 percent of the iodide uptake inhibition (IUI) that commonly takes place in the body. Even at the highest environmental doses detected in drinking water, some studies have reported that perchlorate accounts for less than one percent of IUI. In light of this knowledge and the 2005 NAS study, the EPA inspector general concluded in 2010 that there was no basis for regulating perchlorate as an individual substance.

Under the SDWA, EPA is required to make three specific findings in order to determine that a compound should be regulated:

First, the compound may have an adverse effect on the health of persons. Second, the compound is known to occur or there is a substantial likelihood that it will occur in drinking water systems with a frequency and at levels of public health concern. Third, regulation of the compound, in the sole judgment of the EPA administrator, presents a meaningful opportunity for health risk reduction.

In 2008 EPA, relying on all of the available scientific data, published a preliminary determination finding that the second and third tests were not met and that there was no basis to regulate perchlorate under the SDWA. In its 2011 Regulatory Determination EPA, relying on broad generalizations, concluded that perchlorate met all three of the SDWA tests. With respect to the first test, however, EPA did not cite any new scientific data that disproves or even raises questions about the conclusions reached by the NAS and the other existing studies. Quite simply, EPA is not able to point to scientific evidence that perchlorate, at environmental levels, may have an adverse effect on human health.

With respect to the second test, EPA relied upon an unrepresentative set of data that is eight to ten years old. Since those data were collected, levels of perchlorate in the Colorado River (by far the largest water source that contains perchlorate) have decreased by 80 percent due to cleanup activities. Actions by several states have also resulted in significant decreases in the frequency and levels of perchlorate. EPA chose to ignore this more recent data.

While the third test is solely within the discretion of the administrator, there has to be some rationality to his or her judgment. Where all of the available scientific data demonstrate that perchlorate has no measurable, let alone adverse, effect on humans, including the most sensitive subpopulation, the pregnant woman, it is hardly rational to conclude that regulation of perchlorate presents a meaningful opportunity for health risk reduction.

In recent testimony before the House Subcommittee on Oversight and Investigations, Administrator Lisa Jackson stated: "It is a priority of the EPA and of this administration, to ensure that our regulatory system is guided by science and that it protects human health and the environment in a pragmatic and cost effective manner." Unfortunately, EPA's actions with respect to perchlorate do not meet this standard.

As the nation faces unprecedented pressure on public sector budgets, it makes absolutely no sense to expend limited federal funds to develop a regulation that will force local drinking water providers to invest scarce resources treating a chemical that poses no adverse health effects.

Tom Roberts is a member of the firm at Van Ness Feldman, P.C.

Agency to Regulate Perchlorate

NANCY STONER

Last February, EPA Administrator Lisa Jackson announced the agency's decision to regulate perchlorate in drinking water to better protect public health for millions of Americans. Perchlorate is a naturally occurring and man-made chemical that is used to produce rocket fuel, fireworks, flares, and explosives. Perchlorate can also be present in bleach and in some fertilizers. Research indicates perchlorate may disrupt the thyroid's ability to produce hormones that are critical to developing fetuses and infants.

The administrator's decision is based on an extensive review of the best available science. The Safe Drinking Water Act requires EPA to promulgate a drinking water regulation, if EPA determines that a contaminant meets three criteria. First, the contaminant may have an adverse effect on the health of persons. Second, the contaminant is known to occur or there is a substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern. Third, in the sole judgment of the administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems.

Based on evaluation of the available peer reviewed science on perchlorate health effects, EPA determined that the chemical may have an adverse effect on the health of persons by inhibiting the transport of iodide into the thyroid, resulting in a deficiency of iodide. Thyroid hormones play an important role in the regulation of metabolic processes throughout the body and are also critical to developing fetuses and infants, especially with respect to brain development. Because the developing fetus depends on an adequate supply of maternal thyroid hormone for its central nervous system development during the first and second trimester of pregnancy, iodide uptake inhibition from low-level perchlorate exposure has been identified as a concern in connection with increasing risk of neurodevelopmental impairment in fetuses of hypothyroid mothers. Poor iodide uptake and subsequent impairment of the thyroid function in pregnant and lactating women have been linked to delayed development and decreased learning capability in their infants and children.

EPA collected monitoring data on perchlorate from 3,865 public water systems from 2001 to 2005 under the agency's Unregulated Contaminant Monitoring Regulation, or UCMR. EPA found that 160 (approximately 4.1 percent) of the public water systems reported at least 1 detection of perchlorate at or above the minimum reporting level of 4 micrograms per liter. To determine if perchlorate was occurring at levels of public health concern in these water systems, EPA compared the reported drinking water concentrations to Health Reference Levels for perchlorate.

EPA calculated HRLs based upon the perchlorate Reference Dose recommended by the National Research Council and adopted by EPA in 2005. (The RfD is an estimate of a daily oral exposure that is likely to be without an appreciable risk of adverse health effects.) EPA accounted for the differences in body weight, drinking water consumption, and the amount of perchlorate in the diet at 14 different stages of life to calculate the HRLs that range from 1 microgram per liter to 47 micrograms per liter.

These HRLs are concentrations of perchlorate in drinking water that may result in total perchlorate exposures (from food and water) greater than the RfD for individuals at each life stage. Given the range of potential alternative HRLs and the occurrence of perchlorate in water systems above these levels, EPA determined that perchlorate is known to occur or there is a substantial likelihood that it will occur with a frequency and at levels of public health concern.

EPA estimated the population served by public water systems (PWSs) monitored under UCMR for which the highest reported perchlorate concentration was greater than thresholds ranging from 4 to 23 micrograms per liter. For example, EPA estimated that 5.1-16.6 million people are served by PWSs that are above the Minimal Risk Level of 4 micrograms per liter. EPA determined that a National Primary Drinking Water Regulation for perchlorate could reduce exposures for these populations to levels below the range of thresholds and that such exposure reductions present a meaningful opportunity for the reduction of health risks for persons served by PWSs.

EPA's decision initiated development of a drinking water standard for perchlorate which will be proposed for public review and comment by no later than February 2013. EPA will continue to evaluate the science as we develop the proposed rule which must be promulgated within 18 months of the proposal. For more detailed information about EPA's decision, see http://water.epa.gov/drink/contaminants/unregulated/perchlorate.cfm.

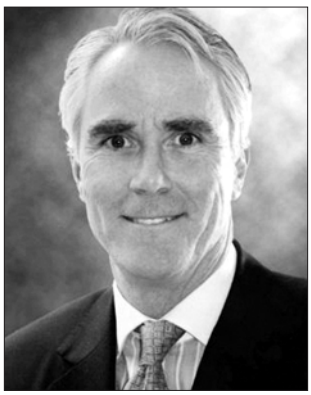
Nancy Stoner is Assistant Administrator in the Office of Water at the U.S. Environmental Protection Agency.

MOVERS

The Senate has confirmed **Daniel Ashe** as the 16th director of the U.S. Fish and Wildlife Service. Ashe is a career employee of the agency.

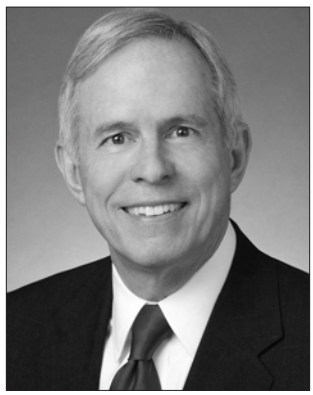
Drinker Biddle & Reath LLP welcomes **Christopher B. Berendt** to its Environment and Energy Practice Group. He joins the firm of counsel and will lead its Environmental Markets Team.

John P. Cahill, former chief of staff to Governor George Pataki, joins Hudson



Valley Holding Corp. as a director. He is currently counsel to the law firm Chadbourne and Park, LLP, where he concentrated on energy and environmental issues.

Former chair of the House Science and Technology Committee **Bart Gordon** has joined K&L Gates LLP as a



partner in the firm's Washington office. Gordon represented Tennessee for 26 years.

Nathaniel Keohane, most recently the chief economist at the Environmental Defense Fund, has moved to the National Economic Council at the White House to help direct environmental and energy policy. He replaces **Joseph E. Aldy,** who is returning to the faculty at Harvard.

Safety-Kleen Systems, Inc., has appointed **Curtis C. Knapp** as chief marketing officer and senior vice president, the first to hold the former position. He joined the company in 2008 as vice president of channel marketing.

Eric S. Lachever joins the Seattle office of K&L Gates LLP, as a partner in the firm's environmental, land and natural resources practice. He comes to K&L Gates from Stoel Rives LLP.

New York Governor Andrew Cuomo has picked **Joseph Martens** as the new commissioner of the Department of Environmental Conservation. Martens has served as president of the Open Space Institute, which works with land conservation groups in the Northeast.

Janet McQuaid returns to Fulbright & Jaworksi L.L.P. as an environmental law partner focusing on energy clients in its Pennsylvania office, which serves companies working on the Marcellus Shale.

Michael Opitz, P.E. LEED AP, has joined The Cadmus Group Inc. as a principal in its Green Building Practice.

Van Ness Feldman announces that **Mark Palmer** has joined the firm a senior director, governmental issues, based in the Washington office. He was formerly with the office of the secretary in the Department of Agriculture**.**

William W. Pollock has become a member of the Ragsdale Liggett law firm as a partner in the litigation department. He comes from Cranfill Sumner & Hartzog and has concentrated on environmental issues.

Steven Russo has been appointed deputy commissioner and general counsel of the New York State Department of Environmental Conservation.

Former EPA deputy general counsel **Kenneth von Schaumburg** has joined Clark Hill PLC as a member in the firm's Government & Public Affairs group in its Washington office.

Matthew L. Stone has joined Pullman & Comley as an associate in the Environmental Law Department. He had been counsel at the Connecticut Clean Energy Fund, where he had represented the fund before administrative law and regulatory entities.

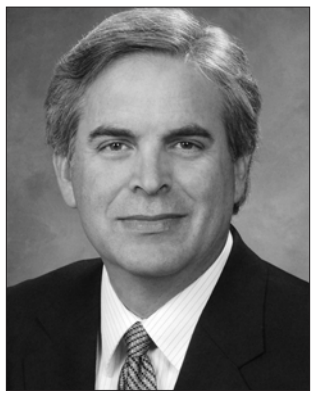
Bill Trout has been promoted to vice president of refining studies at Solomon Associates. He has served as manager of refining studies.

Elizabeth M. Weaver joins the Los Angeles office of Fulbright & Jaworski L.L.P., where she will be a partner in the environmental practice. She leaves Howrey LLP, where she worked on environmental and toxic tort cases.

Susan White, formerly a senior editor at the investigative non-profit ProPublica, will lead its newsroom in the newly created position of Executive Editor as the organization changes its name to InsideClimate News.

SHAKERS

Honigman Miller Schwartz and Cohn LLP announces that



partner **Richard A. Barr** has been appointed to the Environmental Advisory Rules Committee of the Office of Regulatory Reinvention.

CH2M HILL vice president, energy and water division, **Jan Dell** has been appointed to the National Climate Assessment Development and Advisory Committee, part of the Department of Commerce.

Henry Diamond of Beveridge & Diamond, P.C., has received the Lifetime Conservation Achievement Award from the Department of the Interior. The award was presented in recognition of 50 years of efforts devoted to land and water conservation.

Ducks Unlimited chief executive officer **H. Dale Hall** has joined the board of directors of America's WETLAND Foundation.

Robert Kuehn, Co-Director of the Washington University School of Law's Interdisciplinary Environmental Clinic, has been named Associate Dean of the Clinical Education Program. Immediate past president of the Clinical Legal Education Association, Kuehn joined the Washington University law faculty in 2009.

Hinckley, Allen & Snyder LLP announces that **Robin L. Main,** a partner in the litigation, environmental and green law groups, has been appointed to the board of directors of the Rhode Island Green Building Council.

IN MEMORIAM

Ray Anderson, a tribune of sustainability in the corporate world, died at the age of 77. Chairman and chief executive of the world's largest carpet-tile manufacturer, Interface Inc., which he built into a billion-dollar-a-year concern, Anderson was a run of the mill executive when he had an environmental epiphany after reading Paul Hawken's *The Ecology of Commerce.* "I read on and was dumfounded by how much I did not know about the environment, and the impacts of the industrial system on the environment. . . . "A new definition of success burst into my consciousness, and the latent sense of legacy asserted itself. I got it. I was a plunderer of Earth, and that is not the legacy one wants to leave behind. I wept." He revamped the corporate culture around zero input, zero waste manufacturing. He went on to travel the country after transforming Interface, preaching a low-input, low-carbon business model.

ELI Report

Making Law Work for People, Places, and the Planet

Biodiversity Adaptation *Conference in Hanoi kicks off drive to protect ecosystems from climate change on three continents*

In August, ELI traveled to Hanoi, Vietnam, to conduct its first national dialogue as part of its ***New Approaches for Conserving Biodiversity: Adapting Law and Governance to a Changing Climate***. The project, implemented in conjunction with partners in Vietnam, Bhutan, Uganda, Madagascar, the Dominican Republic, and Peru, is analyzing current frameworks and existing literature to identify ways to strengthen legal, regulatory, and institutional systems governing biodiversity to more effectively adapt to climate change.

ELI and its partners produced two key texts — a 130-page resource manual on "Legal and Policy Tools to Adapt Biodiversity Management to Climate Change" and a policymaker's guide on "Strategic Options for Adapting Biodiversity Management to Climate Change."

According to ELI Senior Attorney Lisa Goldman, "ELI is now using the these guides in four in-country workshops to examine what effects climate change is having on biodiversity. We want to see what adaptation measures are needed to better protect biodiversity, and how to incorporate adaptive management into natural resource management."

Goldman led the first workshop, bringing together key stakeholders — including resource managers, policymakers, scientists, and academics — to explore how the two guides can be used to develop concrete strategies. The workshop was planned with ELI's partner, The Law and Policy of Sustainable Development Research Center in Hanoi, and it included officials from the Ministry of Justice, the Ministry of Environment and Natural Resources, the Ministry of Agriculture and Rural Development, Hanoi Law University, the Center for Environment Research, Education, and Development, and other governmental and nongovernmental organizations.

ELI Senior Attorney Lisa Goldman with representatives from Vietnam's Ministry of Natural Resources and Environment and a member of Bhutan's National Environment Commission.

"We found that Vietnam will be preparing several biodiversity-related action plans over the next five years," Goldman remarked, adding "and now, with amendments also planned for the country's Law on Biodiversity, there is a valuable opportunity to capitalize on these openings to incorporate climate change adaptation into the legal frameworks governing biodiversity."

The workshop also included five participants from Bhutan's National Environment Commission, the Royal Society for the Protection of Nature, and the Bhutanese Parliament, who discussed their own experiences with climate change adaptation in Bhutan. These participants will assist ELI in planning the final workshop in Bhutan next spring.

The project was made possible with support from the John D. and Catherine T. MacArthur Foundation and Asia Pacific Network.

Workshop participants discuss climate change adaption priorities for biodiversity protection in Vietnam.

Research in Action *ELI helps with Gulf resource damage assessment*

Natural resource trustees are determining the extent of injuries caused to Gulf of Mexico ecosystems by the Deepwater Horizon oil spill. Required by the Oil Pollution Act of 1990, natural resource damage assessment quantifies impacts to natural resources, and the development and implementation of restoration efforts.

The full extent of liability will be determined through a legal process that could take years, but the natural resource trustees have already announced that BP has agreed to provide $1 billion in funding for "early restoration" to address injuries on an accelerated timeline. Because early restoration is not a legally defined or structured process, many components of the process and agreement are novel.

On September 20, the ELI Ocean Program hosted a seminar, ***Early Restoration in the Gulf of Mexico: When, Why, and How,*** that brought together experts to discuss early restoration of the gulf in the aftermath of the disaster. Moderated by Ocean Program co-director Jordan Diamond and led by ELI President John Cruden, the seminar focused on how restoration fits within the broader NRDA process, and the framework agreement and process. President Cruden, who until recently oversaw the Justice Department's investigation into the disaster and related spill and was involved in the negotiations with BP, said he could think of only one other similar deal that the government has ever made, and that was over a much smaller incident on the Fox River in Wisconsin.

ELI began natural resource damage assessment workshops in Louisiana and Mississippi in early 2011

"My hope would be that not only is it successful but that it will be a model for future NRDA actions," Cruden said of the BP arrangement.

The panel also included Dr. Johanna Polsenberg, Federal Representative of the Gulf Restoration Network, and one of BP's lawyers, Brian Israel of Arnold & Porter. Israel was more cautious than Cruden, saying it was "hard to know" if the same arrangement could be made in different circumstances. "But I do think there's something here that is new that could be directly applicable or a jumping off point in future cases," he added

Research In Action *Training course on preserving aquatic resources*

On September 13-14, ELI's Wetlands Program Director Jessica Wilkinson and Research Associate Philip Womble convened a training course for conservation organizations and local, state, and federal government agencies on in-lieu fee aquatic resource compensatory mitigation. ILF programs establish, enhance, or preserve wetlands with funds collected from permittees required to offset wetlands or other aquatic resources impacts under Clean Water Act Section 404.

The training course was held in Costa Mesa, California, at the offices of the Southern California Coastal Water Research Project. Funded by U.S. EPA Region IX, the course was designed to provide support to the conservation organizations, land trusts, and local governments seeking to come into compliance with the 2008 Compensatory Mitigation Rule.

Twenty-seven ILF program representatives from Arizona, California, Guam, Hawaii, and Micronesia, along with 12 state and federal regulators, participated. Local conservation organizations and agencies, Wilkinson noted "are the most qualified groups in the nation at meeting conservation challenges with creativity and resourcefulness and are inspiring to work with."

Topics covered include the procedural steps and timeline for ILF program approval, different options for structuring an ILF program, the Compensation Planning Framework, developing a fee schedule, credit determination, advance crediting, financial assurances (performance securities), and long-term management funding. The course included not only national examples of these specific aspects of ILF mitigation drawn from programs that are approved under the conditions of the 2008 rule, but also an explanation of different strategies for meeting the rule's requirements.

ILF program representatives commented that the training course provided helpful material for advancing their development of governing instruments that comply with the 2008 rule. One participant added, "Thank you for demystifying this process. We certainly have a forward direction." And as another noted, "We found the course and discussions with key people to be extremely helpful!"

Seminars:

ELI once again held its annual ***Summer School*** series, an array of courses first offered in 1992 that serves as an introduction to the legal and policy foundations of environmental protection. Among this year's experts were: Dinah Bear, formerly of the Council on Environmental Quality, and John Kostyack, National Wildlife Federation, for NEPA, ESA, and Fundamentals of Environmental Law. Patrick D. Traylor, Hogan Lovells, for Clean Air. Alexandra Dunn, Association of Clean Water Administrators, and Erin Flannery, federal government water attorney, for Clean Water. Anna R. Kuperstein, Keller and Heckman, LLP, and Lewis J. Taylor, Venable LLP, for Clean Land: Hazardous Waste and Sites. Gus B. Bauman, Beveridge & Diamond, P.C., and Sara C. Bronin, Center for Energy & Environmental Law, University of Connecticut School of Law, for Land Use and the Law. And Lynn L. Bergeson, Bergeson & Campbell, P.C., for The Law and Policy of Products Regulation.

ELI began a six-part series on ***Toxic Substances Control Act Reform***. "Key Perspectives on TSCA Reform" set the stage for subsequent issue-specific panels by examining the status of TSCA reform in the larger context of federal, state, and international chemicals regulation. The second seminar, "Standard of Safety," examined the central issue of whether and what standard of safety should replace TSCA's current "unreasonable risk" standard for regulating chemicals. "The Hazard, Use, and Exposure Data" explored reform of TSCA requirements and procedures for developing and reporting data on chemical hazards, use, and exposure.

ELI also hosted two seminars on the Marcellus Shale. The first, ***Nuts and Bolts of Marcellus Shale Drilling and Fracking,*** convened panelists to discuss economic, energy, environmental, and legal developments in the exploitation of the Marcellus Shale, which mirror those of other gas fields across the country. ***Beyond Marcellus Shale: Policy Implications of Natural Gas Drilling and Fracking*** addressed policy implications of gas shale drilling in a national energy context.

For audio files, PowerPoints, and more information about these seminars, visit ELI's members-only archive at www.eli.org/Associates/events_archive.cfm.

"Beyond Marcellus Shale" panel discusses implications for balancing energy needs with environmental protection in the future.

Staff

ELI welcomed four new research associates over the summer.

Marion Boulicault grew up in London, England, but studied at the University of North Carolina at Chapel Hill, where she double majored in philosophy and environmental science and minored in chemistry. At UNC, she wrote her senior thesis on community-based natural resource management in Southeast Asia and was also involved in research on indigenous land rights. As a research associate, she hopes to further these interests while also exploring new areas of the environmental law field, such as food systems, agriculture, and water rights.

J. Cory Connolly joins ELI as a 2010 graduate from James Madison College at Michigan State University, where he studied international relations with specializations in Latin American and Caribbean studies and Environmental Economics and Policy. Since graduation, Cory has interned with Fundacion Biosfera (an environmental NGO) in Argentina and worked as a researcher for 5 Lakes Energy in Michigan. Most recently, Cory helped organize and facilitate a non-profit environmental community service program called the Green Economy Leadership Training in an underserved community in Highland Park, Michigan. His research interests include policy and law related to climate, carbon, renewable energy, utility regulation, and fisheries management.

Lynsey Gaudioso graduated from Vanderbilt University in 2010 with majors in environmental science and policy and mathematics. She spent the past year working in Hanoi, Vietnam, as a Luce Scholar at Centre of Live & Learn for Environment and Community, a local NGO. Lynsey previously worked for The Climate Project and South Africa's Department of Environmental Affairs and Tourism where she worked on marine invasive species policy.

Ariana Spawn completed her undergraduate degree in biology at Brown University in May. Her interests range from the science and policy of ocean management to biodiversity conservation and climate change. Prior to joining ELI, she worked on conservation issues at the U.S. Fish and Wildlife Service and at Conservation International.

Research Brief

ELI and Water Law in the West

Elissa Parker
Vice President
Research and Policy

Since its creation in 1969, the Environmental Law Institute has been a leading authority on the laws and policies supporting water quality protection, both in the United States and worldwide. But until recently we had yet to tackle the very different challenges of water quantity management.

That all changed when a talented young law school graduate, Adam Schempp, joined the Institute in 2007. Along with prescience, passion, and fresh energy, Adam brought to ELI a wealth of knowledge about water management in the American West. Committed to a professional path that would assure that water is available to meet the needs of all aspects of society, Adam saw in ELI a home from which he could work to develop practical, equitable solutions to public problems. He recognized the importance of creating the policy and legal foundation necessary to assure that sufficient water will be available to adapt to the next threat or crisis.

As soon as Adam arrived, he began engaging state water officials, water utilities, agricultural users, cities, policymakers, citizens, activists, and scholars who grapple with these issues. Based on his study of how western states address the substantial legal challenges that stand in the way of water reuse and reclamation, in 2008 he provided practical policy options to the state of Washington.

He went on to research the most innovative law and policy developments for adapting to climate impacts and meeting growing demands throughout the West. In 2009, he published "Western Water in the 21st Century: Policies and Programs that Stretch Supplies in a Prior Appropriation World," designed for legislators, state engineers, water managers, advocacy groups, and water rights holders. The handbook has been well received by practitioners across the West, and is even used as law school course material.

Today, under Adam's leadership, ELI has a full-fledged Western Water Program that continues to explore the most promising strategies, case studies, and ideas that can help promote smart and innovative water transfers, usage, and management. "We need to be able to get water to where it's most needed, often very quickly, but with the least amount of ecological, social, and economic damage," Adam explains. "We want to help people make the most informed decisions."

In partnership with the Alliance for Water Efficiency and American Rivers, the program is about to release a report that identifies ways to improve stream flows through water conservation in the Colorado River basin. The report looks at experiences and opportunities ranging from on-farm water efficiency measures to major city-wide conservation programs. Early next year, the program will release an analysis of what makes some water management innovations successful and others fail.

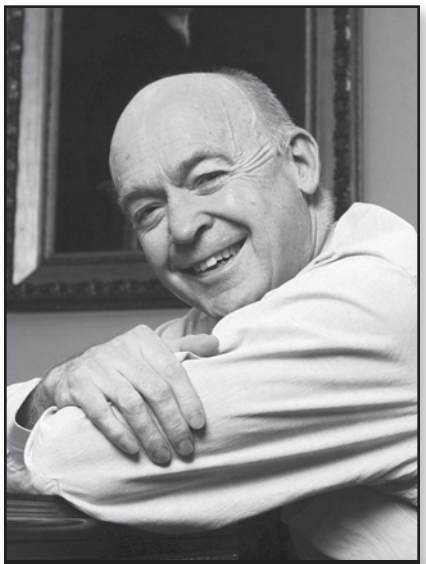
In ELI's tradition of working across disciplines, Adam also is spearheading a comprehensive look at the two distinct areas of water resource law and water quality law. The powerful body of law that governs water use in the West is almost exclusively state law that operates like a specialized form of real property law, while the federal Safe Drinking Water Act, Clean Water Act, and state water quality laws function primarily as regulatory and enforcement-oriented regimes. In most western states, the two areas of law are managed by two different agencies, generally without much coordination.

We all know, of course, that water is not divided that way: water quality impacts quantity and quantity has an effect on quality. In fact, hydrologic modification is responsible for approximately one-fifth of the nearly 300,000 miles of "impaired" U.S. rivers and streams. Conversely, poor water quality can diminish or effectively render useless an individual water right. And yet the laws in each area continue to promote a siloed view of decisionmaking. The program is working to find ways — including changes in institutional structure, process, and interpretation and application of the law — to overcome this artificial divide and achieve practical solutions beneficial to both interests.

"The practice largely has been to avoid raising the ire of the folks on the other side," explains Adam. "With greater uncertainty in supply and greater demand for water, it is increasingly apparent to all parties that avoidance is not sustainable. We owe it to ourselves to have more coordinated solutions to these problems."

Closing Statement

Four Leaders Who Are Still Leaving a Legacy of Accomplishment



John Cruden
President

As part of ELI's continuing effort to record the history of environmental law, Scott Schang, Eugene Kobayashi, and I took the oral history of four leaders last September. Each of these individuals is legendary in our profession, and they speak with passion about the environment.

David Sive has been a friend and mentor of mine for several decades. Before modern environmental statutes were passed, David was litigating cases that many of us studied in law school. His groundbreaking work protecting Storm King Mountain and the Hudson River paved the way for the modern era of environmental law. David was also instrumental in establishing a number of environmental non-profit organizations, including ELI. He was chairman of the board for many years and received the first ELI Award in 1984. Committed to education, David has now taught at over eight law schools, and Pace named its moot court competition in his honor.

John Adams was the co-founder of the Natural Resources Defense Council and its leader for 35 years. During his tenure NRDC was a key force in shaping our nation's environmental statutes and bringing many of the most important cases in environmental law. His stories of those early years are fascinating. His office is filled with memorabilia of the finest moments of a career. As he discussed both environmental accomplishments and continuing shortcomings, you could feel his passion and insight. This year, when the president gave John the Presidential Medal of Freedom, he quoted *Rolling Stone*: "If the planet has a lawyer, it's John Adams." In his recent book *A Force For Nature,* John describes how he obtained the first NRDC office space. He spoke to a colleague at the U.S. Attorney's office who called his cousin, William Beinecke, then chair of the S & H Corporation. According to John, "Bill found me a spare room at the S & H building in Midtown Manhattan. Neither of us suspected at the time that Bill's daughter, Frances, then a student, would later play such a large role in the history of NRDC." We interviewed her next.

Frances Beinecke has been at NRDC since she started as an intern in the early 1970s. Under her superb leadership, as executive director since 1998 and president since 2006, NRDC has been a leader in establishing a clean energy future that curbs climate change, revives the world's oceans, defends endangered wildlife and wild places, protects public health, and fosters sustainable communities. NRDC membership has more than doubled while she was a leader and is now well over a million. She was most recently appointed by the president to be on the national committee on the Deepwater Horizon oil spill. In John Adams's book, he mentions the creation by President Clinton of the President's Council on Sustainable Development, of which he was a member. This important council, made up of cabinet officers, including eight cabinet secretaries and EPA Administrator Carol Browner, also included NRDC. John, however, states that the "real leader of our effort was Frances Beinecke, our program director, who did all the research, immersed herself in complex issues from fisheries to sustainable cities, met everyone, talked to everyone." It was at that moment, John said, that he decided Frances would be his natural successor.

Finally, Denis Hayes, who in his early 20s was selected by Senator Gaylord Nelson to be the coordinator of the first Earth Day, which had participants and celebrants in two thousand colleges and universities, about ten thousand primary and secondary schools, and hundreds of communities. Following the success of the first Earth Day, Hayes founded the Earth Day Network and served as international chairman for Earth Day's anniversaries in 1990 and 2000. Internationally, he is recognized for expanding the Earth Day Network to more than 180 nations. It is now the world's most widely observed secular holiday. During the Carter administration, Hayes became head of the Solar Energy Research Institute. Since 1992, he has been president of the Bullitt Foundation in Washington and continues to be a leader in environmental and energy policy. Hayes has received the national Jefferson Awards Medal for Outstanding Public Service as well as many other honors. *Time* magazine named him as "Hero of the Planet" in 1999.

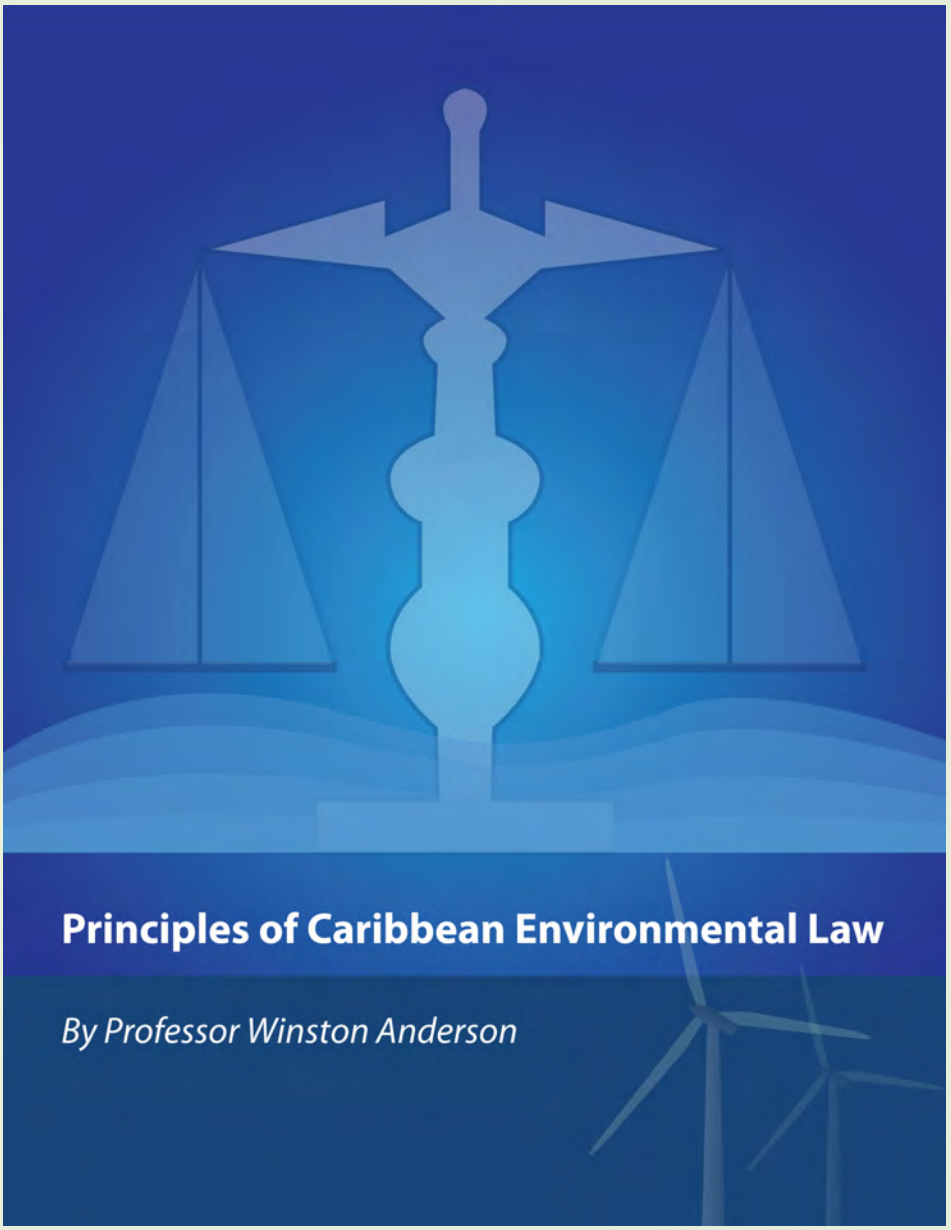
These individuals, and many like them, inspired others with their legal prowess, management and leadership capabilities, and extraordinary vision. Our nation, and the world's environment, benefited greatly from their presence.

C O M I N G S O O N

Principles of Caribbean Environmental Law

By Hon. Professor Winston Charles Anderson

This forthcoming volume by the Honorable Professor Winston Charles Anderson, Judge of the Caribbean Court of Justice (CCJ) Jamaica , offers a one-of-its-kind textbook on environmental law in the Caribbean island communities.



Chapters cover:

International Environmental Law and the Caribbean Environment * Principles of Environmental Law * The Constitution and the Environment * Legislative Regulation Of the Environment * Administrative Environmental Law * The Common Law of Property * The Common Law of Torts * Town and Country Planning * Environmental Impact Assessments * Regulation of Pollution * Waste Management * Conservation of Nature and Wildlife * Coastal Zone and Marine Areas Management

About the author: Judge Anderson is a former professor at University of the West Indies Faculty of Law. His many scholarly publications in the field of private international law have brought a unique Caribbean perspective to that field of jurisprudence. From 2003 until 2006, Judge Anderson left academia and entered the regional service as General Counsel of the Caribbean Community.

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