

My Climate Change

BY ANDREW C. REVKIN

Decades of reporting on climate science and the climate policy debate have led me through a long evolution in my thinking, and I hope to a little practical wisdom.

Some things just seem too momentous to keep in mind. One is the planet we're living on. We're on the third rock from the sun twenty-four hours a day, but I've only been to one place where that awareness is enforced by nature. Squatting on a floe of eight-foot-thick sea ice at the North Pole, drifting on the 14,300-foot-deep Arctic Ocean hundreds of miles from land, with everything in every direction south and the sun circling the horizon, you absolutely feel you are on a planet.

Another momentous thing we hardly ever think about is the thing we think *with*: the brain. I think about mine now quite a bit, ever since a hot July day in 2011 when my eyes started telling me conflicting stories about the nature of the world as I huffed and strained to keep up with my far fitter son running up a steep trail in the woods near my home.

My left eye told me the world was paisley. The right eye insisted all was well. I called out; we returned home. I took a shower and some aspirin, wondering if I could be having a stroke. My son drove me to the hospital. It wasn't a stroke . . . yet.

By the next morning, it was. From my hospital bed, I began reporting and blogging and tweeting about stroke risk and treatment—at least as well as I could in a hunt-and-peck way, given that my right hand didn't work well for about a month. The stroke made me confront that critical human operating system in my skull for the first time.

I'd had the rarer kind of stroke that hits younger people who are not typical stroke candidates. Part of my drive to write about my experience was fueled by my desire to raise awareness; one tweet from the hospital was, "Don't stress your carotid arteries if you like your brain and the things it does for you." But my writing wasn't all selfless. Turning to journalism allowed no emotional space for absorbing the jarring reality that the white spots in my brain scan showed I was breakable—that something as basic as dexterity, let alone a long healthy life, was no longer a given. (Fortunately, I recovered fully, but there was no guarantee that would be the case.) Reporting on my stroke as a medical and health care problem allowed me to treat it as an intellectual puzzle rather than an emotional crisis—to levitate above my mortality instead of confronting it, deeply feeling it, embracing it.

Some challenges are so grand and momentous that anxiety seems, at best, a waste of time and energy in confronting them. It occurs to me, looking back, that my approach to my stroke parallels, in a strange way, my approach to another almost incomprehensibly large challenge: that of how we face climate change. I have spent thirty years covering the growing human influence on the atmosphere and climate—how profoundly, irreversibly, and consequentially we are changing one of Earth's critical operating systems. In essence, we have been learning, as uncomfortably as we navigate puberty, that our only planet is somewhat breakable.

And yet, I find global warming doesn't worry me—at least not in a gut-twisting, obsessive way. Rather, a stripped-down agnostic version of the Serenity Prayer has come to mind lately as I've grappled with humanity's "only one planet" predicament: change what can be changed, accept what can't, and know the difference. Science can help clarify which is which.

With that mix in mind, in both making the most of a finite life and limiting regrets related to global climate change, it seems necessary to integrate two seemingly incompatible traits: urgency and patience. Since my stroke, I've struggled to balance the need to slow down with a rising sense of urgency related to the years ticking down. In my environmental journalism, the result has been lifelong engagement and, more recently, acceptance (if not full-scale embrace) of a lot of inconvenient truths that weren't in Al Gore's film.

I used to think of my reporting as a thousand separate stories. But I can see, as I age, that it is in fact one story—a single meandering learning journey with more than a few wrong turns, surprises, and reversals, starting with a dancing bivalve and scribbled death threat in the late 1960s. I didn't start out wanting to be a journalist; my first fascination, as my childhood was coming to an end, was with biology. Charmed into the undersea world by Jacques Cousteau, I was taken by surprise one summer while snorkeling where a small river meets the sea not far from my Rhode Island home. A bay scallop, trying to evade me, jetted through the sea grass by castanet-clapping its corrugated shells, which were surreally fringed by fleshy curtains flecked with tiny glinting blue eyes.

I quickly moved from embracing nature to defending it. A small patch of woods and fields behind our house remained untouched amid the expanding suburban grid of streets and lawns. Around age fourteen, on one of my regular after-school walks through the trees, I encountered a bulldozer parked in a fresh-cut clearing near my favorite spruce. I placed a scribbled warning on the seat, something like *Whoever chops down this tree will suffer a horrible death.* (A few decades would pass before I reflected back on that bulldozer encounter and realized I had never considered that a bulldozer, just a few years earlier, had cleared the tract our house occupied.)

In high school, a teacher let me and a friend build and refine a crude wave tank in lieu of writing a paper. I loved reshaping the cardboard baffles I taped over an aquarium until the airflow from a fan blew across the water in the tank just right, forming perfect waves breaking on our artificial beach. The experience helped ignite my interest in science. I thought I might become a scientist, in fact, but biology studies at Brown University taught me that I didn't have the close-focus temperament to pursue a Ph.D.

FINDING MY PATH

I shifted to journalism after winning a traveling fellowship just before graduation. My project was to study man's relationship to the sea on some small islands, starting in French Polynesia. Three months in, I ended up studying my own relationship to the sea after encountering a Crew Wanted sign on a pier in Auckland, New Zealand, and signing up as first mate on a circumnavigating home-built sailboat, the Wanderlust.

That journey exposed me to the wonders and ills of a fast-changing world, including the sight of dozens of leopard skins piled on a street corner in Djibouti, at the base of the Red Sea, to entice French Foreign Legionnaires stationed there.

I felt a mix of anger and mission as I photographed the remains of those slaughtered cats, determined to tell their story. Where were they being killed? How could this be tolerated? A week or so later, riding a strong southerly wind up the Red Sea, we sheltered for a day or so in the lee of an uninhabited island off the coast of Yemen. Hiking to the windblown south-facing shore, I stumbled upon a random assortment of intact light bulbs—presumably cast from passing ships over many years—piled in drifts just above the tide line. Small inconsequential wounds to the world, building inexorably.

Energized by these experiences, I pursued journalism in graduate school and forged a path into magazines in the early 1980s—the heyday of science writing. At my first stop, *Science Digest*, I exposed pesticide perils, described the future of the automobile (at the time, the future was the Ford Taurus!), reported on the rise of the supercomputer, and more.

Fairly early on, I began probing what soon appeared to be the ultimate environmental story—our evolving and worrisome relationship with Earth's atmosphere and climate. Until this point, most human assaults on nature were local—polluting a stream, felling a forest. Now, through booming populations and resource appetites, we were going global.

My first in-depth look at human-driven climate change, starting in 1984, focused on the dark sister of global warming—the Cold War prospect of a “nuclear winter.” This was the scary hypothesis that a nuclear war, by incinerating hundreds of cities, could cloak the planet in sun-blocking particles, disrupting agriculture and ecosystems around the world and thus undercutting the logic of a “Star Wars” missile defense. The authors of the key study, including Carl Sagan, had reached this result using computer models that had been built to study global warming as early as the 1950s but were becoming ever more sophisticated as computing power grew. The researchers called the hypothesized post-war chill the “anti-greenhouse effect.” The cover art for my article was an image of Earth frozen in an ice cube.

Subsequent analysis pointed to a more transitory climatic effect, which two climate scientists, Stephen H. Schneider and Starley L. Thompson, called “nuclear autumn” in one piece. Clearly less of a headline there. That pattern would pop up again and again in weighing environmental perils: newly discovered, they were stark and vivid, but in most cases, more science only led to more nuance and more questions—not a good mix for media thriving on stark drama.

Three years later, at *Discover* magazine, I was assigned to write a feature on global warming. Though only well understood by a handful of scientists and policymakers in the mid-1980s, research was revealing that human numbers and technological potency were changing the human-climate relationship in profound ways. Through nearly all of human history, this had been a one-way relationship. Weather patterns changed; ice sheets, coastlines, or deserts advanced or retreated; and communities thrived, suffered, or adjusted how or where they lived. But now, in subtle but measurable ways, the relationship was running in two directions, with enormous potential consequences.

A host of human activities, particularly the burning of fossil fuels and forests, were adding long-lived gases—most important, carbon dioxide—to the atmosphere. These gasses prevented some of the energy that arrived as visible sunlight from escaping as radiating heat. The imbalance guaranteed warming and resulting changes in climate, ice sheets, and sea levels with big implications for humans and other life. It soon became apparent, even back then, that this would be hard to reverse.

Climate change achieved headline status in 1988 because Yellowstone National Park and the Amazon rain forest were ablaze and the eastern United States baked in record heat. After testifying at a high-profile Senate hearing on global warming, James Hansen, the pioneering NASA climate scientist who would later become a climate activist, said, “The greenhouse effect has been detected and is changing our climate now.” Reporters who had been covering the Clean Air Act or endangered species or threats to the ozone layer had a big new story to tell.

It was a heady time. That year, I reported from the first World Conference on the Changing Atmosphere, in Toronto, where a keystone statement spelled out the momentous nature of what was unfolding: “Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war.” The attendees recommended a 20% cut in emissions by 2005. The portentous cover art for my October 1988 climate article was the sweating Earth melting on a hot plate.

In the end, it is values and instincts and particular circumstances—economic and environmental and cultural—that determine what individuals and societies do.

The Toronto meeting, although relatively obscure, initiated the process leading to the first climate treaty, adopted at the Rio Earth Summit in 1992, and the negotiations that have been under way ever since, most recently in Paris, to try to strengthen responses to the threat. Later that year, the American Museum of Natural History staged the first museum exhibition on climate change. Reflecting how much momentum had built around this issue and how mainstream environmentalism had become, the exhibit was co-sponsored by the Environmental Defense Fund and largely funded by the National Science Foundation.

I was invited to write the companion book for the exhibition, and I drew some pretty ominous word pictures to lay out the stakes. In a section on climate history, I described how we were growing potent enough, perhaps, to end the current geological epoch, the Holocene:

Perhaps earth scientists of the future will name this new post-Holocene era for its causative element—for us. We are entering an age that might someday be referred to as, say, the Anthropocene. After all, it is a geological age of our own making. The challenge now is to find a way to act that will make geologists of the future look upon this age as a remarkable time, a time in which a species began to take into account the long-term impact of its actions. The alternative may be to leave a legacy of irresponsibility and neglect of the biosphere that could eventually manifest itself in the fossil record as just one more mass extinction—like the record of bones and footprints left behind by the dinosaurs.

Actually, it was only eight years later, in 2000, that “scientists of the future”—the chemistry Nobel laureate Paul Crutzen and the biologist Eugene Stoermer—proposed that Earth had entered the Anthropocene (a more etymologically sound neologism). As an environmental writer, I was on a roll, with several awards signaling my skill at communicating environmental science. But flipping through my 1992 book now, I see some signs that I was a bit carried away with a sense of mission and more than a bit naïve about the scale of the global warming challenge. For example, there was no basis for this breathlessly optimistic line about how the adoption of the 1987 Montreal Protocol—designed to phase out chlorofluorocarbons (CFCs) and other chemicals threatening the planet’s protective ozone layer—could be a template for curbing carbon dioxide: “The lesson of CFCs can be applied directly to the looming problem of greenhouse warming.”

I hate finding inconsistencies in my own writing, but this line from elsewhere in the same book strongly implies that, even at the time, such a comparison was unduly optimistic:

Of course, eliminating a class of synthetic chemicals is a relatively simple task, as Pieter Winsemius, a former minister of the environment for the Netherlands explained to me at one greenhouse-effect meeting. Substitutes for these destructive compounds are already being developed, he said. “There are only thirty-eight companies worldwide that produce CFCs. You can put them all in one room; you can talk to them. But you can’t do that with the producers of carbon dioxide—all the world’s utilities and industries.” Gases such as carbon dioxide and methane are a byproduct of the processes at the heart of modern civilization: industry, transportation, power generation, and agriculture.

Carbon dioxide had little in common with pollutants of old, stray impurities produced during combustion (sulfur compounds, for example), which could be controlled relatively easily and affordably with filters or catalytic converters. In the case of CFCs, industry had swiftly moved ahead to develop more sustainable, and affordable, alternatives. And it turned out, surprise of surprises, that we didn’t really need aerosol hair spray and deodorants.

Carbon dioxide, in contrast, is a fundamental and long-lived byproduct of burning fossil fuels, and, even now, efforts to capture and store this gas permanently—at a scale relevant to the climate system—remain costly drawing-board pipe dreams. Adding to the challenge, billions of people benefit from the actions creating the risk—burning cheap fossil fuels, spreading fertilizer made with fossil energy, cutting down forests—while most of those who stand to suffer the worst predicted impacts haven’t yet been born. Too, unlike other pollutants, carbon dioxide is also a ubiquitous and normal component of the air—not to mention the bubbles in beer and every exhaled breath. Where’s the peril, the villain, in that?

A TOUGHER AUDIENCE

There was another tough reality I hadn’t fully absorbed yet. Science magazines, books, and museum shows were mainly preaching to the converted. Once I moved to *The New York Times* in the mid-1990s, the phenomenon of global warming itself became a tougher sell, both to my editors and the public. A stock-market correction, an earthquake, a particular hurricane: that’s news. But you’d never see a banner headline proclaiming Planet Warms, Coasts Flood, Species Vanish, People Flee even though all of these things are sure to happen in a human-heated world—over decades or generations, and always amid a mix of old-fashioned truly natural disasters.

Still, they were great years for reporting. The paper sent me far and wide. In 2003, after several years of trying, I made that North Pole trip, spending three days with scientists camped on the drifting sea ice near the North Pole, studying the shifting ocean conditions for clues to how warming would affect the region. My addictions to science and nature were never more fully fed. Squatting by the edge of an expanding opening in the ice—staring at formations called “frost flowers” that formed where the frigid but steaming water met the twenty-below-zero air—I was so mesmerized that a Russian camp worker had to rush over and physically pull me back.

Some part of me anticipated a hero’s welcome when I returned to the newsroom, towing a huge duffel of Arctic gear. After all, I had literally gone to the ends of the Earth. But the newspaper was embroiled in controversy: a young reporter, Jayson Blair, had been caught serially fabricating details in stories.

An ambitious package of climate change articles planned that year was spiked as new management, more focused on core issues, settled in.

The path to the front page was through covering climate politics, not climate science. I think one reason the issue was covered so often through the lens of politics is that doing so made the solution seem easier. After all, the only thing missing was political will, campaigners insisted. Stories that had villains and heroes, the empowered and the powerless—those were (often appropriately) news.

I thrived under this model, too. Advancing in newspaper journalism is mostly about the “get”—publishing the telling piece of evidence, ideally uncovered through wile or enterprise, that lays bare some nefarious activity or portentous threat. I got a series of exclusives on the Bush administration’s meddling at the National Aeronautics and Space Administration (NASA) and other agencies. And in 2006, it was with some pleasure that I saw one of my front-page stories—about a former oil lobbyist who had softened the language in government climate change reports while in the Bush White House—scrolling on Al Gore’s laptop screen in *An Inconvenient Truth*.

By then, I’d written hundreds of newspaper and magazine stories as well as two books about global warming, burning rain forests, melting glaciers, and the rest. I was hitting the peak of my influence among Earth-loving activists and loving it. After all, I was among my kin, in essence, as a liberal, Ivy League, middle-class Northeasterner. My responsibilities as a journalist were, at least at that moment, aligned with my longtime passion for protecting the environment.

CLIMATE APOSTASY

But then my underlying hunger for reality spoiled things.

I saw a widening gap between what scientists had been learning about global warming and what advocates were claiming as they pushed ever harder to pass climate legislation or strengthen the faltering 1992 climate change treaty. Mind you, there was usually a much bigger gap between the science and the views of industry supporters defending fossil fuels or fighting environmental regulations or taxes. But to me, the monumental nature of the task facing those trying to move the world away from fossil fuels called for extra attention to detail.

Maybe, as the climate scientist Thomas Crowley later proposed, I was also prone to a kind of “reverse tribalism”—a variant on Groucho Marx’s aversion to being a member of a club that would have him as a member.

Thus it was that I found myself diverting from the pack—and not just environmental campaigners. In early April 2006, *Time* magazine ran a cover story intoning “Be Worried. Be Very Worried.” That would really kick people into acting, right? Well, no, I learned, as I began interviewing behavioral scientists about what prompts people to act or recoil. On Earth Day weekend that year, I wrote a piece titled “Yelling Fire on a Hot Planet,” which noted how hyperbole not only didn’t fit the science at the time but could even be counterproductive if the hope was to engage a distracted public. I always stressed that uncertainty was not a reason to relax, but warned that downplaying known unknowns simply empowered those seeking no action at all.

In 2006, I was part of a team of reporters at *The Times* that undertook a multi-year series called “The Energy Challenge” (nytimes.com/energychallenge), examining what it would take to deeply cut reliance on coal, oil, and gas, and move to climate-friendly technologies. The deeper we dug, the more we ran into enormous disconnects between the data and the claims. It was very clear that any transition to clean energy would be neither simple nor quick—and it wasn’t only for lack of political will.

I toured labs at Caltech with Nate Lewis, a chemist focused on improving solar panel performance. He described the challenge of transforming America’s fossil-dominated energy systems this way: “We already have electricity coming out of everybody’s wall socket. This is not a new function we’re seeking. It’s a substitution. It’s not like NASA sending a man to the moon. It’s like finding a new way to send a man to the moon when Southwest Airlines is already flying there every hour, handing out peanuts.”

And then there was the other end of the energy spectrum—areas of the world where electricity wasn’t coming out of a socket for hundreds of millions of people because there was no socket, or light bulb. More than a billion people lacked a way to cook that didn’t produce clouds of toxic indoor smoke. It became vividly clear that the world will need far more clean energy than even fossil fuels are currently providing as the human population heads toward a predicted mid-century peak of nine billion or so and poor nations push to improve well-being. The gap in energy access has contributed to rising tensions in the climate talks between nations that have already prospered burning fossil fuels, with prosperity reducing vulnerability to climate hazards, and those where hundreds of millions of people still cook in the dark on dried dung or firewood, with millions dying young each year from avoidable indoor pollution.

Renewable electricity sources like solar panels could help in many places that probably will never see a conventional power grid. But swelling cities need central power plants, as well. I took some consolation in looking back at my very first climate story, from 1988, and seeing a line which warned that this issue would loom: “[E]ven as the developed nations of the world cut back on fossil fuel use, there will be no justifiable way to prevent the Third World from expanding its use of coal and oil.” Great. I had seen it coming. Maybe we all had. But that foresight didn’t make the challenge now any smaller.

Journalism’s norms also required considering the full range of views on a complex issue like climate change, where science only delineated the risk but societal responses would always be a function of considering various tradeoffs. In 2007, I included Bjorn Lomborg’s climate book, *Cool It*, in a roundup of voices from “the pragmatic center.”

Lomborg, a Danish political scientist, became a widely quoted contrarian pundit after the publication of *The Skeptical Environmentalist*, a previous book that had challenged—and was vigorously challenged by—the environmental science community.

Given how Lomborg hadn't resisted having his arguments wielded by factions seeking no action to cut climate change risks, my description of him was not apt.

But the reaction from longtime contacts in environmental science was like a digital sledgehammer. An e-mail string excoriating the story was forwarded to me in hopes I would understand how far I had strayed. In the exchange, one of the country's top sustainability scientists told the others: "I think I'm going to throw up. I kept trying to believe that Andy was quite good, albeit subject to occasional lapses as well as rightward pressure from NYT higher-ups. But this is really too much. We have all over-rated him."

The intensity of feelings, the divergent views of data, prompted me to examine old questions in new ways. For twenty years, I'd been reporting on climate change as a mechanistic geophysical problem with biological implications and technical, economic, or regulatory solutions. As a science writer, I was so focused on the puzzle that, I suddenly realized, I had neglected to consider why so little was happening and why so many people found the issue boring or inconsequential.

As I dug deeper into studies of human behavior and risk misperception—a different kind of science—much of what I learned posed potent, nearly existential questions, especially for a journalist. Like many of my friends in environmental sciences and journalism, I had long assumed the solution to global warming was, basically, clearer communication: fresh innovation in mixing pictures and words, video and graphics, different metaphors. If we could just explain the problem more clearly, people would see it more clearly, and then they would change.

There were countless attempts, often relying on metaphor:

Climate is your personality; weather is your mood.

Carbon dioxide added to the atmosphere is like water flowing into a tub faster than the drain can remove it—and the drain is getting clogged. (The bathtub effect!)

The greenhouse effect is building like unpaid credit card debt. Reducing spending doesn't eliminate the debt.

There was, of course, the simmering frog failing to jump out of the pan.

On my blog, I tried breaking the language down to clear up disputes over which climate science conclusions were established and which remained uncertain. But I came to realize that the answer could not be found in clever slogans. Empirical studies and a batch of surveys pointed to a set of biases, reflexes, and cognitive filters that almost guaranteed failure in trying to galvanize broad action on global warming given the long time scales, enduring uncertainties, geographic spread, and lack of quick fixes.

One finding, by the British climate communication expert George Marshall, obliterated one of my longstanding assumptions—that people with children were more likely to be concerned about climate change because of its impact on their offspring. He found that, in fact, parents often appeared less concerned because they were so fixated on the day-to-day challenges of raising a family. Then there's status quo bias (we overvalue the way things are), confirmation bias (we select information to reinforce established views), and motivated reasoning (even when we think we're thinking objectively, we're not).

I looked into the "cultural cognition" research of Dan Kahan, a professor of law and psychology at Yale, who has the animated mannerisms and wardrobe of Quentin Tarantino. Among a host of sobering findings, he showed that scientific literacy abounded at both ends of the spectrum of beliefs on global warming. So I tried a little experiment: I sifted for Nobel laureates in physics who'd expressed strong views on global warming. It turned out there was one to suit just about anyone's argument, from deep worry to total unconcern.

As a journalist in my fifties, pondering how to make the most of the rest of my productive years, this was a more profound blow than that stinging e-mail from former fans years earlier. It was even worse than hearing Rush Limbaugh, from the other side, suggest in 2009 that if I really thought people were the worst thing for the planet, I should just kill myself.

A NEW PATH

Ultimately, the insights that these findings revealed helped drive my decision late that year to leave full-time reporting for academia. (Of course, journalism itself was going through profound changes at the same time, and my growing conviction to try new paths fortuitously coincided with an attractive buyout offer.)

The job title I concocted for my position at Pace University—Senior Fellow for Environmental Understanding—was meant to reflect that I was exploring how to make information matter, but in a new way. My *Dot Earth* blog moved to the Opinion side of *The Times* in 2010, but, as I stated at the time, my opinion was still that reality matters.

I hardly gave up communicating. In fact, I write more than ever, and I teach others how to make the most of the rapidly changing online information environment. It's changing even faster than humans are changing the biophysical environment.

And the more time I've spent focusing on that sobering behavioral research, the more I'm realizing that it points to distinct opportunities to make progress on climate-smart energy steps and policies, which can create more resilient communities. Paradoxically, though, in some instances this would require something odd: not talking about global warming at all. Most powerfully, a recent nationwide analysis by researchers at Yale and Utah State University found that although asking questions about global warming reveals muted passions on both ends of America's deeply polarized political map,

asking different questions can mute the differences. For example, both red and blue voters strongly support investing in more research on renewable energy sources and regulating carbon dioxide as a power plant pollutant.

There are plenty of other examples across the board. There are libertarians who crave the taste of energy independence that comes with a rooftop solar panel. There are liberals who hate the idea that taxpayers should pay the bill when people who build repeatedly in flood zones get reimbursed under federal insurance policies that don't reflect the real risk.

And as that national survey showed, there is widespread support for invigorating this country's lagging investments in basic sciences related to better battery technology or solar panels, more efficient vehicles and electrical grids, and possibly even a new generation of nuclear plants. It's time: American investment in basic research in energy-related sciences has been a dribble for decades compared to the money poured into science in other areas, such as defense and homeland security or the cancer fight.

And yet, it's important to remember that science doesn't always lead in directions you might expect.

Take, for example, fracking, shorthand for the hydraulic fracturing technology that has greatly expanded access to oil and gas reserves that were thought to be untappable. The roots of this technology lay in federally funded research that sat dormant until pioneering energy entrepreneurs, spurred by declining gas and oil supplies, adopted it. (I've been supportive of tightly regulated fracking but recognize that this leads to a longer tail on the era of gas and oil than those proclaiming Peak Oil foresaw.)

Here's the other problem: science doesn't tell you what to do.

The climate scientist Ken Caldeira, who studied philosophy in college, likes to paraphrase the 18th-century philosopher David Hume when describing the line between values and data: "You can't get an ought from an is."

In the end, it is values and instincts and particular circumstances—economic and environmental and cultural—that determine what individuals and societies do. In open societies, and in a variegated global discourse on climate vulnerability and energy access, that means there will inevitably be divergent stances and tradeoffs.

Those of us with a science bias expect that proper research will lead us to a menu of objective fixes, but you have to realize that even a passion for investing in science as the source of answers is the result of a value judgment.

It was Pete Seeger who helped me understand this as we sat in the kitchen of his hand-hewn home tucked high on the wooded shoulder of the Hudson Highlands overlooking Newburgh Bay. Pete was a friend and neighbor, with whom I'd been singing and conversing since I moved to the Hudson Valley in 1991.

He recalled how his father, a musicologist, used to prod friends who were scientists: "You think that an infinite increase in empirical information is a good thing. Can you prove it?"

Pete then described how his father would then exclaim that faith in science is no different than faith in anything else.

"Face it, it's a religion," Pete said.

Numerical goals, for example, are fine as first steps in considering options, and they provide a useful rallying point for activists. But to me, it seems they are being wielded as some hybrid of science and moral authority—Moses's tablets inscribed with Einstein's equations. For global warming, the reality remains a sliding scale of interrelated choices and outcomes, as John Holdren, President Obama's science advisor, has been pointing out for many years, and as each of five reports on climate science from the Intergovernmental Panel on Climate Change has found. There are no clear-cut choices—only a mix of mitigation of emissions, adaptation to impacts, and suffering.

The intensity around numbers and particular strategic goals, like convincing Obama to kill the Keystone XL pipeline extension, has driven wedges between climate and energy factions that might otherwise have been allies. In 2013, grappling with the intertribal tensions over how to end our oil addiction, I did some Web searching for the terms "response . . . diversity . . . environment" to see if anyone had explored how or whether environmental campaigns might tolerate common but differentiated approaches to progress.

I admit it was personal. I was tired of being called a "hippie puncher" and VSP ("very serious person") by the liberal green blogger David Roberts for arguing that whatever President Obama chose to do about the pipeline, oil demand had to be addressed or despoliation of the environment (whether in Canada or elsewhere) was inevitable.

My Google search turned up a remarkable 2003 paper on the sources of ecosystem resilience by Thomas Elmqvist of Stockholm University and others. It included this line:

The diversity of responses to environmental change among species contributing to the same ecosystem function, which we call response diversity, is critical to resilience. Response diversity is particularly important for ecosystem renewal and reorganization following change.

As I read it, I pondered whether the following slight tweak might also be true:

The diversity of responses to environmental change among *people* contributing to the same *social* function, which we call response diversity, is critical to resilience. Response diversity is particularly important for *social* renewal and reorganization following change.

Can the environmental movement find room for diverse strategies?

I hope so. It's utterly human to have varied responses to change and challenges—in this case, humanity's intertwined energy and climate challenges. I see great value, for example, in the work of students and academic colleagues pursuing divestment from fossil fuel companies. To me, there's particular merit in examining investments and divestment as a path to putting ossified terms and norms under fresh scrutiny. Is a school's endowment more than its financial investments? Is fiduciary responsibility limited to preserving those assets measured only in dollars and cents? Are trustees of a company, university, or planet responsible only for sustaining values measured that way?

But I also see the value in engaging with—dare I say it, even working for or investing in—big companies as a way to test the possibility of building a different culture from the inside out.

Rather than looking at either strategy as right or wrong, I see both as part of a broadening commitment to a new and durable human relationship with both energy and climate.

One thing that this approach requires is a willingness to accept, even embrace, failure and compromise.

A helpful metaphor came to me in a conversation about a decade ago with Joel E. Cohen, a demographer and development expert affiliated with Columbia and Rockefeller University. He said that after the sprint of the last couple of centuries, humans would do well to seek a transition to a more comfortable long-distance pace more suited to adulthood than adolescence.

Walking, he reminded me, is basically “a controlled forward fall.” It is a means of locomotion by which one moves steadily ahead, adjusting to bumps or hurdles, even trips and collisions, shifting course as needed but always making progress toward the desired destination.

Essentially, societies need to find a way to fall forward without falling down.

The prismatic complexity of climate change is what makes it so challenging to address, but this also means everyone can have a role in charting a smoother human journey. I've come to see the diversity of human temperaments and societal models and environmental circumstances and skills as kind of perfect for the task at hand. We need edge pushers and group huggers, faith and science, and—more than anything—dialogue and effort to find room for agreement even when there are substantial differences.

At the level of nations and cultures, a diversity of approaches is also inevitable, and that's why the recent shift in climate diplomacy away from a binding top-down model to a flexible but credible and inclusive agreement, although long seen as a failure (including by me in early stories), is a perfectly human version of success.

It's notable that Pope Francis last year stressed the need for diversity and dialogue in his historic encyclical on equity, climate change, and environmental care. He didn't hesitate to state his views on consumptive capitalism, but despite being the ultimate top-down leader of a top-down institution—he is *il Papa*, after all—Francis said that dialogue and compromise between worldviews are key to whatever comes next.

Like a parent confronted by squabbling kids, he was essentially saying, “Work it out.”

By the time the encyclical was released, I had already gotten a feel for what was coming. The foundation for much of Francis's papal letter was laid at a remarkable Vatican meeting in early May 2014, convened by some of his top advisers at the Pontifical Academy of Sciences. I'd been invited to serve as a respondent after four days of presentations and discussions by several dozen scientists, philosophers, economists, church figures, and human rights activists. The title of the conference perfectly captured the question on the floor: “Sustainable Humanity, Sustainable Nature, Our Responsibility.”

If you had told me a decade or two ago that some of the most valuable reporting I would do on climate, energy, and environmental sustainability would take place at the Vatican, I would have probably chuckled. An agnostic lapsed Reform Jew and science writer inside those high stone walls? Yet there I was.

The opening plenary, delivered by one of Francis's top advisers, Cardinal Óscar Andrés Rodríguez Maradiaga of Honduras, had a potent line that piercingly captured humanity's core dilemma: “Nowadays, man finds himself to be a technical giant and an ethical child.” Could our ethics and empathy, our self-awareness and time scales of concern, catch up with our potency?

Sessions ranged from the deeply philosophical (“People and Nature: Antagonism or Concordance?”) to the concrete (“Food Production in the Anthropocene”); from the hopeful (“The Promise of Mega-Cities”) to the apocalyptic (“Existential Risks”). Even the phrase *birth control* was uttered, albeit briefly.

After dinner on the final evening, in one of the ornate rooms of the Casina Pio IV, built as a summer home for Pope Pius IV in 1561, I turned to Walter Munk, the ninety-eight-year-old Scripps Institution oceanographer who, among other things, played a role in helping Allied amphibious invasions succeed by refining wave forecasts.

“What do you think it will take for humanity to have a smooth journey in this century?” I asked.

Munk didn't mention science or technology, carbon capture or a carbon tax, fusion power or political will.

“This requires a miracle of love and unselfishness,” he said.

And there I was, a lifelong science writer in the Vatican, smiling and buoyed and chucking my stick-to-the-data “very serious person” persona and embracing the utterly human magic in that reply.

Returning home from heady events like that one, I'm always eager to escape into the woods around our Hudson Valley home, to scuff my feet in the leaf litter and clear my head. With my wife and sons, I occasionally return to the "Chimney Trail" where my left eye's paisley signals hinted at a tear in the lining of my left internal carotid artery and at the clot and stroke to come. Needless to say, I no longer sprint as we follow the curling path uphill, crossing rocky stream beds and resinous soft carpets of aged pine needles, to the windswept ridge where the fieldstone chimney that gives the trail its name stands, like a sentinel, overlooking the full sweep of the Hudson Highlands.

The cabin built there a century ago by Rhinelanders Waldo, a New York City police commissioner, long ago burned to the ground and, like so much of Hudson Valley lore, has vanished into the soil. It's impossible to sit there without pondering history, from nearby hills once topped by Revolutionary War encampments to Storm King Mountain, where a legal battle over a pumped-storage power plant spawned the modern environmental movement.

For me, it's a place that also brings to mind climate history. The rounded contours of the Highlands speak of a billion years of erosion, including the grinding passage of the mile-thick ice sheet that advanced toward the Atlantic in the last ice age, which ended 12,000 years ago, leaving the great gravel heap we call Long Island, sixty miles to the south, before retreating.

These days, it's hard for me to sit there without pondering the climate to come, which scientists tell me is unlikely to include a new ice age given that the long-lasting greenhouse buildup of the Anthropocene will overwhelm the subtle orbital changes that bring back the cold.

After such musings, I get up and start the hike back down toward home, always a bit more careful on the gravelly spots, poised to catch myself—to fall forward instead of falling down.

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CITE THIS ARTICLE

Revkin, Andrew C. "My Climate Change." *Issues in Science and Technology* 32, no. 2 (Winter 2016).

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