Union of Concerned Scientists

{C Catalyst

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The California "Green Rush" Takes Hold

Federal Scientists Report on Science Under Trump

Examining the Science of Voting

Union of Concerned Scientists

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The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with people across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

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Pictured on the cover: This solar array in Los Angeles is just one of the many ways in which California is showcasing its national leadership in low-carbon policies. Read more on p. 9.

Time to Reinvigorate Our Democracy

By Ken Kimmell

As *Catalyst* goes to press, Americans are about to head to the polls for what is surely one of the most important midterm elections in our history. As the leader of a nonprofit organization with tax-exempt status, I can't tell you to vote for any particular candidate. But I *can* remind you of what's at stake for our democracy.

Only by engaging in our political system can we create communities that have clean water, good schools, and protections for public health and the environment. As UCS Kendall Fellow Michael Latner shows on p. 16, political districts with the most environmental degradation also tend to have restrictive voting laws. Voting is how we start to create a government that works for us.

Of course, we need to engage in other ways too. One of the truly inspiring things about serving as president of UCS at such a difficult political moment is that I've seen firsthand how UCS members and supporters have risen to the challenge. For example, the UCS Science Network has grown roughly 50 percent in the past two years and has played a critical role in standing up for science and pushing back against governmental abuses and unfit nominees. Our many Science Champions from diverse backgrounds have also dramatically stepped up their engagement.

With your support and that of our many partners, UCS has fought hard in this political climate and won some important victories. Now is the time to cast our ballots. Regardless of the outcome, I can promise you this: UCS will continue to fight for clean energy and a stable climate, an agriculture system that produces healthy food for all, a world safer from nuclear weapons, and a strong role for science in public decisionmaking. By working actively together, we can reinvigorate the founders' original ideal of a government of, by, and for the people.

Photos: jorgeantonio/iStockphoto (voting); Richard Howard (Ken Kimmell)

WHAT OUR MEMBERS ARE SAYING

Here's a sampling of recent feedback from the UCS Facebook page (*www.facebook.com/unionofconcernedscientists*) and Twitter feed (*www.twitter.com/ucsusa*).

ON THE UCS REPORT *UNDERWATER* THAT WARNS OF THE THREAT POSED BY SEA LEVEL RISE TO COASTAL REAL ESTATE

Liz Rattican:
Recently it was reported that there would be nine inches of water covering the land that I live on in 30 years. Not that I will probably be here, but there are four building projects for apartments and condos within walking distance of my building. What are they thinking?

Linda Fitz Hoover:
I live in one of those pink zones [on your interactive map] but several miles inland so we won't be impacted. I have been hearing since the 1980s that there should be restrictions on building but they are ignored.

Bob Vitray:
So far the actuality has been exceeding even the worst-case scenarios in speed and magnitude. My sister lives in Florida where they dread storms that come on a high tide and have seawater backing up through the storm drains.

ON THE GOVERNMENT'S MOVE TO BAIL OUT STRUGGLING COAL PLANTS

Win Farmer:
It would be a lot better to retrain out-of-work coal miners for the jobs of the future. Far better from many viewpoints.

@PrairieWisdom:
Wind power: responsible for more jobs than coal mining. The solar industry employs more people than all of the coal industry. Solar jobs alone outnumber coal jobs in almost two-thirds of states. Wind jobs outnumber coal jobs in more than 20 states. Solar and wind together beat coal in 40 states.

ON THE RELATIONSHIP BETWEEN DRIVER AND ELECTRIC VEHICLE

Kimberly Weldon:
I've had my EV since November, and I couldn't be happier. It's an absolutely amazing car, and a thrill to drive.

Frank J. Perricone:
Just got solar power so my EV is now charged only with locally sourced, homegrown electrons!

ON THE TRUMP ADMINISTRATION DISMISSING SCIENCE-BASED DECISION-MAKING FOR OUR NATIONAL PARKS

Kitty Mackin:
I'm surprised there hasn't been an executive order issued . . . repealing all science.

Susan J. Broatch:
If not science, then what? Horoscopes? Tea leaves? Maybe a Magic 8 Ball. Any decision that is not science-based is a crime against the environment, the citizens, and the future.

[IN THIS ISSUE]

UCS Helps Expose Threat Posed by Toxic Compounds

This spring, documents obtained by the Union of Concerned Scientists through the Freedom of Information Act revealed that Trump administration officials at the White House and the Environmental Protection Agency (EPA) had blocked the release of a draft government toxicology report on a specific class of chemical compounds over fears of the public health concerns it would raise. As one administration official privately warned in an email, the report's release could lead to a "public relations nightmare."

Highly fluorinated chemicals—known as a group as PFAS (perfluoroalkyl substances)—are human-made chemicals used in products ranging from firefighting foam and nonstick cookware to stain-resistant carpets and microwave popcorn packaging. Desired for their ability to repel oil, grease, and water, their molecular strength makes them so long-lasting in the environment that they have even been dubbed "forever chemicals."

Partially as a result, they have now been found in measurable levels in many drinking water supplies and most Americans are believed to carry trace amounts in their bodies. Although PFAS have largely escaped environmental regulation to date, they have been linked to cancers, developmental and reproductive toxicity, thyroid disease, immune system toxicity, and other effects.

The revelation by UCS of the Trump administration's suppression of the information, followed by bipartisan congressional pressure, forced the administration's hand. The 852-page draft toxicology report, released in June from a branch of the Department of Health and Human Services, analyzed the relevant peer-reviewed scientific data on 14 of the most common variants of PFAS and determined that the safe level of exposure in drinking water should be 7 to 10 times lower than what the EPA currently recommends.

TWO-THIRDS

OF THE 131 MILITARY SITES UCS MAPPED HAVE PFAS IN GROUNDWATER IN CONCENTRATIONS

AT LEAST 100 TIMES HIGHER THAN SUGGESTED SAFE LEVELS.

BAD NEWS FOR MILITARY FAMILIES

Given the new report's conclusion that these chemicals are more dangerous than previously recognized, a UCS team studied how widespread a contamination threat they pose. They found that PFAS are remarkably widespread in the United States' drinking water, sometimes at alarmingly high concentrations, especially on and near US military installations (where firefighting foams are heavily used). At the former England Air Force Base in Alexandria, Louisiana, PFAS compounds were found in concentrations roughly *1 million times higher* than the new suggested safety threshold.

All told, UCS mapped 131 active and formerly active US military sites and found that every site but one exceeded the new safety threshold. At 88 sites—roughly two-thirds of those studied—PFAS concentrations were *more than 100 times higher* than the new threshold.

UCS is calling for an immediate, nationwide government effort to control the distribution and disposal of PFAS, and to clean up the contamination that has already occurred. A top priority should be notifying military personnel, their families, and surrounding communities about the risks and protecting them from potential exposure. More information is available at *www.ucsusa.org/toxicthreat*.

Photo: Ken Wright/US Air Force

Underwater Report Makes Waves with New Audiences

Rachel Cleetus (right) joined climate, mortgage, and policy experts for a September briefing of the report to congressional and federal agency staff.

In June, UCS released *Underwater: Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate*, a report on the financial risks facing residents of coastal communities as sea levels continue to rise. With this clear-eyed assessment of the potential economic losses ahead for business owners, current homeowners, prospective home buyers, renters, and city and town governments, the team behind the report intended to reach audiences UCS had not previously targeted, including the real estate, insurance, and finance sectors.

So far, the report has been widely cited, garnering more than 1,250 media mentions across more than 35 states—including ABC, CNN, *The Guardian, USA Today,* the *Washington Post,* and many local news outlets in coastal states. The report's webpage has been viewed 45,000 times, and its interactive mapping tool that allows people to explore the report's findings down to the zip code level has received more than 165,000 views. The report has also drawn attention from trade journalists at CBS MoneyWatch, *Building Design and Construction,* and *Insurance Journal*. On the airwaves, an episode of the UCS podcast *Got Science?* featuring one of the coauthors has been listened to more than 5,000 times and picked up by 15 community radio stations.

UCS has already met with Texas Senator Ted Cruz's office, the New Jersey Department of Environmental Protection, and the Mortgage Bankers Association, among others, and our analytic team has produced fact sheets with information specific to each of the 132 coastal congressional districts in the continental United States, which we will use to engage with their respective legislators. Visit *www.ucsusa.org/underwater* to view the full suite of information, including a guide for prospective home buyers, Spanish-language materials, and insights from market experts.

Science Rising Grows to Include More Than 100 Events

To help galvanize science-loving voters in the run-up to the midterm elections, UCS and its partners launched Science Rising, a nationwide community engagement effort. Science Rising is a clearinghouse of local activities, events, and actions organized by many different groups, with the shared goal of ensuring science is central to the decisionmaking processes that affect us all—and to fight back against efforts that sideline science from that crucial role in our democracy.

By summer's end, Science Rising had logged more than 125 events with 118 groups, including informational sessions on renewable energy, a public forum featuring indigenous women climate activists, Twitter chats on diversity and representation in the STEM fields, a workshop in Puerto Rico that trained local scientists to get involved in policymaking decisions, lobbying days, rallies, webinars, and trainings designed to help scientists take action on the issues they care about.

Science Rising will continue offering support and guidance to groups around the United States who are organizing activities and trainings for science and science supporters even after the midterm elections. Find an event near you, or resources to organize your own event, at *www.sciencerising.org*.

Photos: Anusha Narayanan/UCS (Underwater); Omari Spears/UCS (Science Rising)

ExxonMobil Quits ALEC

Yielding to pressure from its shareholders and UCS, ExxonMobil announced in July it had ended its longtime affiliation with the American Legislative Exchange Council, a climate change–denying lobbying group. On top of its annual dues, the company gave ALEC nearly $1.93 million from 1998 to 2017.

ALEC conferences have routinely featured speakers who reject climate science, and the group has supplied state lawmakers with a range of fossil fuel industry–drafted legislation for members to sponsor, including bills that would restrict investment in renewable energy, eliminate incentives for electric vehicles, and hamper the solar industry's ability to sell electricity directly to customers.

Since 2012, more than 100 corporations including BP, ConocoPhillips, and Royal Dutch Shell have quit ALEC, in many cases because of its regressive policy positions.

Kathryn Mulvey, director of the UCS climate accountability campaign, called on ExxonMobil to leave ALEC in a statement she read at the company's annual shareholder meeting in 2016, noting that more than 26,000 UCS supporters had sent messages to the company demanding that it stop funding ALEC. Later that year, UCS released its inaugural *Climate Accountability Scorecard,* and ExxonMobil was rated "egregious" for continuing to spread climate disinformation, partly through its leadership role in ALEC.

Some ExxonMobil shareholders have long been concerned about inconsistencies between the company's statements acknowledging the need to confront climate change and its lobbying against climate solutions. More than a quarter of shareholders supported a resolution in 2016, 2017, and again this year calling on the company to file detailed reports on its lobbying expenditures. Each resolution specifically referenced the company's ties to ALEC.

A few months before ExxonMobil finally broke those ties, the company sent another signal of possible change for the better when it opposed a draft resolution sponsored by the Heartland Institute calling on the EPA to reconsider its "flawed" conclusion that climate change threatens human health. This so-called endangerment finding requires the EPA to regulate carbon dioxide and other global warming emissions as hazardous pollutants under the Clean Air Act.

Has ExxonMobil truly changed its ways? Not quite. The company is still financing think tanks and trade groups that denigrate any and all climate solutions, providing cover for Congress and the Trump administration to do nothing. UCS will press the company to break its ties with these groups as well, and align its lobbying with its stated support for climate action.

Speaking Out for Future Generations

UCS Research Director Gretchen Goldman testifies at a public hearing at the EPA—with her newborn son as living proof of what's at stake should the agency approve a rule to limit what kind of science can be used to develop health and safety protections.

Photos: Bloomberg (ExxonMobil); Trisha Sheehan/Moms Clean Air Force (Gretchen Goldman)

Toxic chemicals released during a 2012 fire at this Chevron refinery in California threatened thousands of nearby residents, nearly half of whom live in poverty.

UCS Wins Court Victory on Safety at Chemical Facilities

In August, a federal court ruled that the EPA must immediately implement the Chemical Disaster Rule, calling the Trump administration's attempts since March 2017 to delay implementation arbitrary and illegal. UCS and coalition partners had filed a lawsuit to compel the administration to enforce the law, which had been developed during the Obama administration to keep communities safer from toxic disasters, to increase transparency about potential chemical threats, and to improve coordination with emergency responders.

Andrew Rosenberg, director of the Center for Science and Democracy at UCS, hailed the court's verdict, saying, "This is a victory first and foremost for the neighborhoods most susceptible to dangerous and toxic chemical releases. Families who live under the shadow of chemical facilities deserve safer practices to prevent future disasters."

However, the EPA has proposed a new rule that would gut many provisions of the Chemical Disaster Rule, such as eliminating the requirement that facilities handling potentially dangerous chemicals provide more information to first responders and neighboring communities. UCS is fighting this proposal and recently released a white paper titled *The Impact of Chemical Facilities on Environmental Justice Communities* that explains how, by removing preventive measures, the Trump administration's proposed changes make chemical releases to neighboring communities more likely to occur. More information is available at *www.ucsusa.org/EJchemicalimpacts.*

Scientific Article by UCS-Led Team Gets Noticed

A pathbreaking peer-reviewed article coauthored by UCS Director of Climate Science and Senior Scientist Brenda Ekwurzel and UCS Chief Scientist Peter Frumhoff in the September 2017 edition of the journal *Climatic Change* has been downloaded an impressive 55,000 times. Articles in this journal more often tally downloads in the low hundreds.

The article quantifies how much of the increases in global temperature and sea level rise can be attributed to the carbon emissions from fossil fuels sold by major oil and gas companies. Building on recent findings that nearly two-thirds of all industrial carbon emissions can be traced to just 90 major oil and gas producers, the authors determined that the emissions traced to these 90 companies are responsible for roughly 57 percent of the observed rise in atmospheric carbon dioxide; between 42 and 50 percent of the rise in global mean surface temperature; and between 26 and 32 percent of global sea level rise since 1880.

These findings set the stage for future studies that could link emissions from industrial carbon producers to specific damages from climate change, and encourage further scientific and policy consideration of these companies' legal and financial responsibilities. In a sure sign that the research is getting noticed, the article now ranks in the top 5 percent among the 8 million academic publications tracked by Altmetric.

Photo: Josh Edelson/Reuters

THE CALIFORNIA
HOW UCS HELPED

GREEN RUSH: POINT THE WAY

With smart, science-based policies, California shows the world it's possible to reduce emissions, protect the environment, and grow the economy at the same time.

By Elliott Negin

In a pathbreaking new development, California Governor Jerry Brown recently signed a law directing the state to run its electricity grid on 100 percent clean energy sources by 2045. It's the most far-reaching clean energy goal of any state so far, but it's also just the latest example of the state's leadership in implementing commonsense, science-based protections. It was the first state to seriously address smog—years before Congress passed the Clean Air Act—and, since then, it has implemented model pollution control, climate, and conservation measures while expanding its economy at the same time.

While California's leadership is widely recognized, less well-known is the indispensable role the Union of Concerned Scientists has played in providing the technical foundation for California's enlightened energy and environmental policies.

"For more than two decades, UCS has helped shape transportation, energy, and climate standards in California that are templates for state, national, and even international environmental law," says Adrienne Alvord, director of the West Coast office. "Most recently, we helped establish new fields of research on electricity grid modernization, sustainable water systems, and climate-resilient infrastructure, and we are continuing to produce cutting-edge analysis on how to best decarbonize our energy and transportation systems."

California has proven the validity of UCS analyses with real-world results. Consider, for instance, its passage of a landmark bill in 2006 calling for a reduction in carbon emissions to 1990 levels by 2020. This July, the state announced it had accomplished that goal in 2016, four years ahead of schedule. Emissions were down 13 percent from their 2004 peak—equivalent to taking 12 million cars off the road. Equally impressive, over that same 12-year span the state's economy grew 26 percent.

Photo: David Paul Morris/Bloomberg

California's policies geared toward reducing vehicle emissions—policies UCS helped to develop and strengthen—are the reason there are so many clean car options available to drivers across the country.

THE ROAD TO CLIMATE-SMART POLICIES

The first—albeit short-lived—UCS victory in California set the stage for decades of victories to come. In 1990, the state legislature passed a "feebates" bill based on a proposal developed by then-UCS Transportation Program Director Deborah Gordon, who opened our West Coast office two years later.

The basic idea was simple, Gordon explains. "If you bought a fuel-efficient, low-carbon vehicle, you would get a rebate, but if you bought a gas guzzler, you would pay a fee. The policy subscribed to the 'polluter-pays' principle and was revenue-neutral—two essential ingredients for bipartisan sponsorship." Feebates would promote sales of more-efficient vehicles, save their drivers money at the pump, and reduce tailpipe emissions.

Unfortunately, Governor George Deukmejian vetoed the bill on September 30, 1990, his last day in office. Despite the 11th-hour loss, Gordon says, "Feebates put UCS on the map and helped establish the organization as a prominent player on climate policy."

With UCS offices established in Cambridge, Massachusetts, and Washington, DC, it made sense for the organization to plant a flag in California given the state's unique authority under the 1970 Clean Air Act to implement its own air pollution standards, stricter than the federal government's, and for other states to follow its example. That waiver put Sacramento in the driver's seat for US clean air policy, since a dozen Northeast states—representing a third of the US auto market—have chosen to adopt its rules so far.

Thanks to the feebate proposal—which was subsequently adopted by Maryland; Ontario, Canada; and several European

UCS West Coast Office Director Adrienne Alvord (third from left) looks on as Governor Jerry Brown signs a bill directing California to get 100 percent of its electricity from clean, renewable sources by 2045.

countries—California lawmakers and agency officials began looking to UCS for other innovative ideas. Over the next few years, Gordon and her team proposed a variety of ways to reduce tailpipe emissions, including insurance requiring drivers to pay higher premiums the more miles they drove, a rapid transit system with dedicated bus lanes, and "congestion pricing" for toll roads that required drivers to pay higher tolls during peak travel hours.

Perhaps the biggest impact UCS had on California's vehicle emissions policies in the 1990s, however, was the role we played in prodding lawmakers to strengthen the state's 1990 zero-emissions vehicle (ZEV) program. Although automakers ultimately failed to meet the original bill's requirement that 10 percent of the vehicles sold in California by 2003 had to be ZEVs, the program has had a ripple effect nationwide, says current UCS Clean Vehicles Program Director, Michelle Robinson.

"The ZEV program is the reason there are hybrid and electric vehicles on the road today," she says. "Without the California program, we almost surely wouldn't have seen that progress."

A SEMINAL REPORT

In October 1999, just weeks before the election that eventually put George W. Bush in the White House, UCS released its first climate change impact report focused on the state, *Confronting Climate Change in California*. The timing was fortuitous: the Bush administration's hostility toward climate science created a national policy vacuum that California was only too happy to fill.

According to Mary Nichols, chair of the California Air Resources Board, the report prompted state lawmakers to take action. As secretary of the California Natural Resources Agency in 2002, she wrote to UCS to explain "how influential the Union of Concerned Scientists report *Confronting Climate Change in California* has been in galvanizing attention in our state around the need to act on climate impacts and solutions.

"Your report provided our public policymakers with the best available solid science explanations necessary to confirm the fact that climate change is real and that it matters to California. . . . [It] laid the groundwork for California's historic passage, and signing by Governor Gray Davis, of the [2002] greenhouse gas bill making California the first state in the nation to order automakers to lower global warming emissions from passenger vehicles."

That same year, the legislature—with technical support and strong advocacy from UCS—also passed the nation's strongest renewable electricity standard at the time, requiring utilities in the state to get 20 percent of their power from the wind, sun, and other renewable energy sources by 2017. Four years later, after UCS briefed California's legislature on climate change, Assemblywoman Fran Pavley—who introduced the 2002 vehicle global warming emissions bill—coauthored a bill requiring the state to slash global warming pollution from all sectors of the economy 25 percent by 2020, reducing it to 1990 levels. Signed into law in 2006, it was the nation's first economy-wide carbon emissions reduction law.

PUSHING AHEAD

Pavley's innovative 2006 bill was the most ambitious effort yet passed to reduce global warming pollution, but even its supporters acknowledged that more cuts would be necessary to slow the rate of climate change. So, while state agencies scrambled to draft new regulations to satisfy the Pavley law, UCS went to work to push California even further. To bolster that effort, we hired Pavley's environmental policy director, Adrienne Alvord, to run the West Coast office in 2011.

(continued on p.20)

Photos: scharfsinn86/AdobeStock (cars); Image Source Plus/Alamy Stock Photo (family); Joe McHugh/California Highway Patrol (Jerry Brown)

FEDERAL SCIENTISTS SPEAK ON THE STATE OF SCIENCE UNDER PRESIDENT TRUMP

UCS surveyed scientists in 16 government agencies. What we found is sobering.

By Pamela Worth

Scientists employed by the US government deserve credit for the nation's mostly safe drinking water, reduced smog, and airbags and unleaded gasoline in our cars, not to mention the moon landing, saving the bald eagle, and thousands of innovations and protections that safeguard our environment and health. Most federal scientists are dedicated public servants who choose to work at government agencies because they understand how science can help improve people's lives and they hope to carry out research that will be beneficial to society.

A recent Union of Concerned Scientists survey of more than 63,000 federal scientists across 16 government agencies found that the respondents' good intentions—and the science-based missions of their agencies—are being stymied by the Trump administration.

More than 4,200 scientists answered the survey's 58 questions about staff capacity, morale, and political interference, and UCS worked in partnership with Iowa State University's Center for Survey Statistics and Methodology to tabulate the results. (A full reporting of the UCS survey results is available at *www.ucsusa.org/2018survey*.) We found scientific integrity being compromised on a number of fronts.

1 WIDESPREAD UNDERFUNDING AND MISMANAGEMENT

Nearly 80 percent of survey respondents across all 16 agencies reported workforce reductions: staff cuts, hiring freezes, and a failure to replace staff members who have retired or quit. Of those, 87 percent said the reductions in budgets and staff have undermined their ability to fulfill their agency's scientific mission. The Environmental Protection Agency (EPA) has been hit particularly hard in this regard, with staff levels at a 20-year low.

"MANY KEY POSITIONS REMAIN UNFULFILLED, DIVISIONS ARE UNDERSTAFFED, AND PROCESS HAS SLOWED TO A CRAWL."

—FISH AND WILDLIFE SERVICE SCIENTIST

Jacob Carter, a research scientist with the Center for Science and Democracy at UCS, led the team administering the survey. Before joining UCS, he worked at the EPA, developing policies to protect communities from contaminants during floods driven by climate change. Carter left the EPA before President Trump took office; if he had chosen to stay, he says, he suspects he would not be working on climate change—if he even had a job at all.

Photo: Kenny CMK/Shutterstock

"WE ALL JUST WANT TO DO OUR JOBS TO THE BEST OF OUR ABILITIES . . . BUT EVEN THOSE WHO HAVE SPENT 30+ YEARS AT CDC ARE CONCERNED THAT, FOR THE FIRST TIME, POLITICS ARE BEING PUT ABOVE SCIENCE. THIS RUINS SCIENTIFIC INTEGRITY, AND EVERYTHING THAT WE STAND FOR."

—CENTERS FOR DISEASE CONTROL AND PREVENTION SCIENTIST

2 RAMPANT POLITICAL INTERFERENCE

Half of all respondents across agencies agreed or strongly agreed that political interests are now hindering their agency's ability to base policy and decisions on science. Notably, 76 percent of respondents at the National Park Service reported this, as did 81 percent of respondents at the EPA. Scientists at the EPA also reported problems with the "fox-guarding-the-henhouse" nature of Trump administration appointees: some 70 percent of respondents agreed or strongly agreed that agency leaders, picked from the very industries they are supposed to be regulating or who have a financial stake in deregulating those industries, have inappropriately influenced agency decisionmaking.

"THE CURRENT ADMINISTRATION SEES PROTECTING INDUSTRY AS PART OF THE AGENCY'S MISSION AND DOES NOT WANT TO CONSIDER [ANY] ACTION THAT MIGHT REDUCE INDUSTRY PROFIT, EVEN IF IT'S BASED ON SOUND SCIENCE. WE ARE NOT FULFILLING OUR MISSION TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT AS A RESULT."

—EPA SCIENTIST

Carter says that the sizable majorities making such claims surprised his team, which has conducted this survey seven times since 2005. "In the past, we've seen more respondents cite limited staff capacity, or not having enough resources and funding to do their work," he says.

"But this year, the top barriers reported to science-based decisionmaking were all related to political interference.

3 EVIDENCE OF CENSORSHIP

While climate change proceeds mostly unabated, our federal scientific enterprise is being largely prevented from addressing the problem. Carter says that while some scientists have been asked outright not to mention climate change, others say they are self-censoring so as not to incur a backlash from their leadership.

"WE'VE BEEN TOLD TO AVOID USING WORDS LIKE 'CLIMATE CHANGE' IN INTERNAL PROJECT PROPOSALS AND COOPERATIVE AGREEMENTS. . . . IT PUTS A PALL ON WORK INVOLVING CLIMATE CHANGE, WHICH IS CENTRAL TO MANAGING THE PARKS."

—NATIONAL PARK SERVICE SCIENTIST

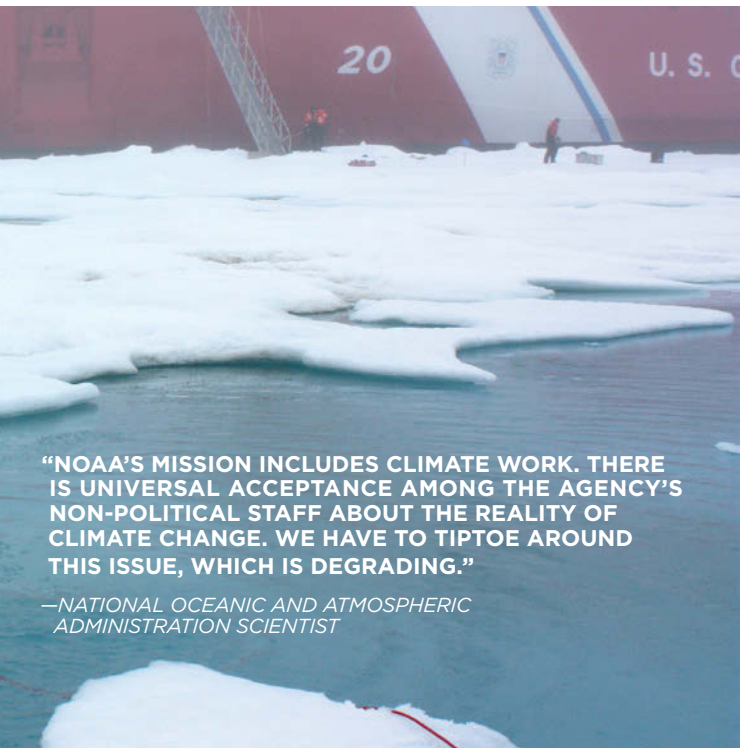
And as he analyzed the survey, he says he got a sinking feeling about his former employer: at the EPA, nearly 150 scientists, or 35 percent of the respondents from that agency, said they'd been asked to omit the phrase "climate change" from their work, and another 30 percent said they had avoided working on climate change or using the phrase even without explicit orders to do so.

"Imagine being literally afraid to do your job," Carter says. "My former colleagues and friends are really committed to the science-based mission. It's hard to see these kinds of responses."

FAR-REACHING IMPLICATIONS

Of course, it's not just the scientists themselves who suffer when science is sidelined at the federal level. "More vulnerable populations—low-income populations, communities of color—are generally hit the hardest when policies are not

Photos: geniusksy/Adobe Stock (ad); Kathryn Hansen/NASA (Arctic)



"NOAA'S MISSION INCLUDES CLIMATE WORK. THERE IS UNIVERSAL ACCEPTANCE AMONG THE AGENCY'S NON-POLITICAL STAFF ABOUT THE REALITY OF CLIMATE CHANGE. WE HAVE TO TIPTOE AROUND THIS ISSUE, WHICH IS DEGRADING."

—NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION SCIENTIST

being informed by science or existing rules and standards are reversed," Carter says. People with the least amount of voting power are affected as well; Carter says a good example is the rollback of the Stream Protection Rule—designed to protect people living near mountaintop-removal coal mining operations from toxins in their drinking water—which was reversed shortly after President Trump was elected.

"That was a Department of the Interior regulation," he says. "Later on, the department even stopped a scientific study by the National Academy of Sciences on the health impacts of mountaintop-removal coal mining. Whatever interests were behind these decisions, it's clear they weren't considering the health of the communities who now have to drink this water."

Carter says the Trump administration has clearly intended to roll back environmental and public health safeguards—in many cases, even if it means going against the scientific evidence. "The agencies responsible for the environmental regulations the administration is seeking to undermine or get rid of," he says, "are the same agencies where federal scientists reported the most widespread abuses of scientific integrity. I don't think it's a coincidence."

Still, although this year's survey revealed new lows in many categories, Carter emphasizes some bright spots. "Based on my personal experience with the Trump administration and how they've treated scientists, I expected the results to be even worse," he says. Scientists at many agencies, including the Centers for Disease Control and Prevention, Food and Drug Administration, and National Oceanic and Atmospheric Administration, reported a fairly high degree of satisfaction with their leadership, and that they were able to do good work without fear of censorship.

"I think that points to how resilient the scientific workforce is," Carter says. "Despite a difficult political climate, they're doing the best they can." {C}

WHAT YOU CAN DO TO PROTECT FEDERAL SCIENCE

DOCUMENT YOUR OBSERVATIONS

Federal employees and grantees with science-related jobs should document any challenges, problems, or concerns related to an agency's scientific integrity. Check out our guide to keeping notes at *www.ucsusa.org/makeanote*. "It's important," says Carter of the Center for Science and Democracy at UCS, "to have a record of all these scientific integrity issues even after this administration is gone."

CONTACT THE SCIENCE PROTECTION PROJECT

Federal scientists who wish to expose or prevent a violation of scientific integrity within their agency, and who need confidential advice, can contact the UCS Science Protection Project to speak with experienced attorneys about the best course of action—get started at *www.ucsusa.org/scienceprotection*.

JOIN THE UCS SCIENCE NETWORK OR BECOME A SCIENCE CHAMPION

Scientists, engineers, economists, public health professionals, and other experts are invited to join the UCS Science Network (*www.ucsusa.org/science-network*) to put your knowledge to work on issues that affect our health and safety. Science enthusiasts can become UCS Science Champions (*www.ucsusa.org/sciencechampions*) and learn skills for engaging on science-related issues.

"Science Network members and Science Champions keep people up to date on comment periods, what's appearing in the *Federal Register*, attacks on science," says Carter. "They also provide folks with the tools and resources they need to effectively push back on anti-science actions."

TALK TO YOUR ELECTED OFFICIALS

"Anyone can talk to their decisionmakers and ask for more oversight of government agencies to make sure science remains in its rightful place in the policymaking process," says Carter.

EXAMINING THE

SCIENCE OF VOTING

What's the relationship between electoral reform and environmental justice? Just ask UCS Kendall Fellow Michael Latner.

By Elliott Negin

For most US college students, political science—poli sci—is a misnomer. Undergrads typically read Locke and Mill, Hamilton, Arendt, Marx. At the introductory level, poli sci is mainly about political *philosophy*, not science. It should be called poli phi.

At the graduate level, the quantitative aspects of the discipline are far more apparent, including a vibrant subset of poli sci that focuses on the science of electoral systems. The Union of Concerned Scientists has taken notice. Last fall, the organization selected Michael Latner, an associate professor at California Polytechnic State University in San Luis Obispo, as the first scientist to receive an electoral system science fellowship under our Kendall Science Fellow program.

"The voting rights debate has often focused on fairness and civil rights, but we were interested in its broader impact on democracy and science-based decisionmaking," explains Andrew Rosenberg, director of the Center for Science and Democracy at UCS. "In other words, how does the abrogation of voting rights affect policymaking on the wide range of issues UCS cares about? We found that there is strong quantitative science around voting rights that could help us understand the impact. And we found that working on voting rights gives us an opportunity to connect with new partners in civil society."

EXPLORING THE LINKS

Latner is uniquely equipped to help UCS enter the voting rights fray. His award-winning academic work has largely focused on how redistricting, gerrymandering, and electoral laws influence political representation. During his two-year fellowship, he is broadening the scope of his research to include the impact of electoral system bias on public health and environmental protection—two key UCS priorities.

As he puts it, "If you are concerned about environmental justice, you need to be concerned about voting rights and electoral reform."

Latner was exposed to politics early on growing up as the son of a union pipefitter and a part-time employee in the county registrar's office in San Bernardino, California. But it wasn't until

he was working toward his PhD in political science at the University of California–Irvine that he became fascinated by the mechanics of our electoral system.

"The two biggest influences on my career, David Easton and Rein Taagepera at UC Irvine, spent a lot of time thinking about the 'science' of political science," Latner says. "David was instrumental in introducing systems theory into the study of politics. Rein, who is a physicist by training, is a pioneer in the science of electoral systems. He transformed the field by applying predictive models of system performance. Rein completely changed the way I approached my research and got me excited about studying the impact of changing electoral laws."

EVIDENCE-BASED AND ENGAGED

In 2007, Latner joined the faculty at California Polytechnic State University, and over the last decade he has written numerous articles for peer-reviewed journals and coauthored a book on gerrymandering. He and his coauthors are now working on a sequel, slated to come out next year.

Latner is also engaged in local politics, serving as a consultant for city council and state assembly candidates since 2010. "As a citizen," he says, "I have a responsibility to engage. My interest in this subject is not an 'ivory tower' thing. That's what attracted me to UCS. It provides a home for engaged scientists, and my mission is to advocate for evidence-based electoral reform."

Latner's recently published first report for UCS, *Building a Healthier Democracy*, found a direct correlation between suppressed voter turnout and environmentally degraded communities. Nearly two-thirds of the congressional districts with above-average levels of air pollution had below-average voter turnout in 2016. Why? "Poverty and restrictive election laws," says Latner. "Residents in low-income communities with state-sanctioned voting barriers have less political clout. When they have less clout, their interests aren't well represented and they are more likely to feel disenfranchised and opt out of the system. It's a vicious cycle." For a broader discussion about problems with US electoral systems and potential solutions, see the Q&A at right.

"One of the most rewarding things about my field is that it's an objective study of institutional performance on the one hand, while being centrally concerned about justice on the other," Latner explains. "Measuring the impact of election laws on participation and representation is a powerful way of quantifying injustice. Besides that, the ability to precisely evaluate the effectiveness of electoral law reform provides a powerful tool to design institutions that reflect our professed principles of equality and fairness. So it's a rewarding scientific pursuit, and it has real-world consequences." {C}

"It's Time to Change the Way We Vote"

Q&A with Michael Latner

President Trump claimed that millions of people voted illegally in the 2016 general election. He even convened a commission to investigate voter fraud, which was ultimately disbanded without finding any evidence of widespread impropriety. Is there any reason to believe such claims?

MICHAEL LATNER: The president and other voter fraud conspiracy theorists are living in a fantasy world. The conspiracy theory itself was put on trial this year when Kansas Attorney General Kris Kobach, cochair of the president's fraud commission and a leading voter fraud alarmist, was held in contempt for disregarding a judge's orders to notify thousands of Kansans that they were eligible voters.

In June 2013, the US Supreme Court struck down key elements of the 1965 Voting Rights Act and, since then, the Supreme Court has upheld Ohio's voter roll purge and Texas's gerrymandered districts, despite a lower court ruling that Texas had discriminated against Latino voters. Is there hard evidence that election practices such as these are suppressing the vote?

MICHAEL LATNER: Vote suppression means preventing eligible voters from exercising their right to vote. In Ohio, aggressive voter file purging has kept thousands of eligible voters off the rolls. Unfortunately, unreasonable practices like that are likely to spread to other states now that the Supreme Court has upheld Ohio's voter roll purge.

The impact of gerrymandering—racial or partisan—isn't to suppress the vote, but to dilute it. Vote dilution occurs when—even if everyone voted—the value of individual votes is diluted as a result of "cracking and packing" voters geographically. The clearest example is when you have a state that is 50-50 in terms of party support and the party that controls the state legislature cracks up the opposition party's voters geographically, packing them into just a few districts where they may be 80 percent or more of the voters, while in many other districts they make up less than 50 percent of voters. That strategy allows the governing party to take a majority of seats, sometimes even without a majority of overall votes.

Photos: Brian Blanco/Getty Images (voting, p. 16); Ja-Rei Wang/UCS (Michael Latner)

Many US voting machines are outdated and vulnerable to hacking. We already have evidence that Russia has tried to hack election software and records. Is that an issue you plan to address?

MICHAEL LATNER: Voting machine security and technology is not my area of expertise, but it's clear that these machines are more vulnerable than most people realize.

Several organizations, most notably the National Academy of Sciences, Engineering, and Medicine's Committee on the Future of Voting, have convened a series of meetings to bring together experts from a variety of fields to discuss measures to enhance security, addressing everything from cyber and digital vulnerabilities to the adoption of voting centers and other administrative innovations. These meetings have led to proposals for meaningful, sound reform.

Second, there are potential policy changes that would improve federal oversight of both state election administration and private-sector election technology. For example, the Department of Homeland Security is now developing a program that would enable national labs to analyze flaws in election security.

UCS should support efforts to strengthen these kinds of programs and ensure that Congress funds them. UCS also could play an important role by making sure our government protects the public interest when overseeing election technology reforms.

I focus more on key institutional electoral reforms that could strengthen the integrity of US elections. UCS supporters can promote a number of these reforms, such as automatic voter registration, to build more comprehensive, secure eligible-voter databases. Other registration and voting modernization measures with sound scientific backing include preregistration, early and weekend voting, and mail-in ballot access, all of which would relieve the pressure of processing ballots on election day.

What is the best way to remedy the gerrymandering problem?

MICHAEL LATNER: There is no single best approach. There are multiple criteria—including equal population, contiguity, compactness, and fairness—that can be optimized, but they can't all be optimized together, so there are trade-offs. Practically speaking, it's not difficult to create fair maps, that is, maps that treat both party's voters equally, and for me, equality is the ultimate metric that we should optimize, because that is the goal of electoral representation. But that might require funny-looking districts, or districts that include communities with very different demographics and political preferences.

> ***Electoral reform may not be as sexy as clean water, but if we want clean water, we need clean election laws.***

Crucially, these trade-offs are an inherent feature, not a bug, of the single-seat districts that US electoral systems typically rely on. Each district sends only one representative to Congress. If we want to more accurately represent political preferences over geography, we have to make geography less important, and the only way to do that is to move to multi-seat, proportional electoral formulas.

Consider a state with five congressional districts where candidates from the dominant party win all five districts by getting 60 percent of the vote. Their party would control 100 percent of the state's overall representation even though 40 percent of the state's residents voted for the other party's candidates. Conversely, if the five single-seat districts were combined into one five-seat district encompassing the entire state, that same statewide vote share would produce three seats—60 percent—for the majority party and two seats—40 percent—for the minority party. Everyone's vote counts and there is real competition.

This is not anything radical or new. In fact, the United States has quite an interesting history of advocacy for proportional elections going back to the founding of the republic. But as politics have become more polarized, and two-party competition becomes more strained, the defects of our electoral system have become more pronounced.

In the work you've already done for UCS, you found that in states with voting barriers, low-income communities have less political clout and higher levels of pollution. What can be done to remedy that?

MICHAEL LATNER: Communities should have a say in policies that affect their daily lives. Automatic voter registration, increased ballot access, and creating nonpartisan, proportional election districts would encourage voter participation, which in turn would put pressure on elected officials at the local, state, and federal levels to pay more attention to their constituents.

When it comes to environmental justice, reformers need to understand that they can advocate and organize all day, but when they're working in a system that distorts representation via gerrymandering, voter suppression, and the like, they won't get very far. Electoral reform may not be as sexy as clean water, but if we want clean water, we need clean election laws. Fortunately, we now have a mature scientific approach that can be applied to our electoral systems.

In closing, do you have any advice for UCS members regarding the upcoming election?

MICHAEL LATNER: Vote early and often! OK, don't vote often, but vote!

The New California Green Rush

(continued from p.11)

> ***UCS provided research, data, and advocacy that helped California make the transition to a low-carbon economy.***

"UCS had a brilliant, highly effective team in place that had been instrumental in securing the passage of every significant climate, clean energy, and clean transportation standard on the West Coast," Alvord recalls. "UCS provided the research, data, and advocacy that explained not only why states need to address climate change, but also how they can transition to a low-carbon economy."

With Alvord at the helm, the West Coast office continued its winning streak, providing trenchant analyses in support of a low-carbon transportation fuel standard, groundwater protection legislation, regulations to reduce diesel truck and bus emissions, and updated versions of the state's renewable electricity standard and Pavley's 2006 law.

For example, a 2015 UCS report demonstrating that California could significantly increase its reliance on renewable energy helped convince the state legislature to pass a bill boosting the state's renewable electricity standard to 50 percent by 2030. After its passage, the bill's sponsor, Senate President Pro Tem Kevin de León, praised the organization for providing "compelling, fact-based arguments" and "helping to broker agreement with a large and disparate group of stakeholders."

A year later, UCS was instrumental in convincing the legislature to pass another Pavley-authored bill expanding on the carbon emissions reduction goal she set 10 years earlier. Signed into law by Governor Jerry Brown in 2016, it requires California to cut its emissions 40 percent below 1990 levels by 2030. Following recommendations made by UCS, Brown said the state could reach that target by reducing vehicle petroleum use as much as 50 percent, tightening its low-carbon fuel standard, and putting 1.5 million zero-emissions vehicles on California roads by 2025.

California's leadership is especially critical at a time when the Trump administration is attempting to undo the climate policies of the Obama administration. It serves as a model for other states and, as the fifth largest economy, California climate leadership is also meaningful on the global scale.

WHAT'S NEXT?

Given that the transportation sector accounts for about 40 percent of California's air pollution, the UCS West Coast office is continuing its efforts to lower barriers to electric car sales, promote widespread use of low-carbon fuels, and reduce emissions from heavy-duty trucks and transit buses. We are also in the middle of the fight to prevent the Trump administration from rolling back federal fuel efficiency and carbon pollution standards, and blocking attempts to strip California of its authority to set tougher standards. This threat has implications not only for California emissions, but for those of the states that follow California standards.

California—like the rest of the country—needs to not only take steps to reduce carbon emissions even further, but also adapt to a changing climate. Last summer, more than a thousand wildfires burned more than 250,000 acres in California, making it painfully obvious that the state's infrastructure is incapable of withstanding climate change–related extreme events.

UCS has been aware of this deficiency for some time. We designed and led the effort to pass legislation in 2016 establishing a working group of scientists and engineers to advise the state government on upgrading infrastructure and safeguarding new facilities, and published a white paper in 2017 making the case for investments in resilient "climate-smart" infrastructure that the working group used as a guide for its recommendations, published in September.

"We are now exploring new areas and are poised to go even further," Alvord says, including showing California how it can successfully manage the electricity grid with an unprecedented level of renewable energy. "This is an exciting time to be doing this work on the West Coast, where we have been able to show real progress in lowering emissions while continuing to grow a world-class economy and creating markets for clean energy and transportation solutions that misguided federal policies cannot stop." As other states grapple with similar issues, they are finding much to emulate in the innovative solutions California and UCS have been successfully pioneering for decades. {C}

Photos: David McNew/Getty Images (wind); Tyler Mussetter/mportraitsgallery.com (Ben Lai); AdobeStock (ad)

This LinkedIn Employee Goes All In for UCS

Ben Lai is a problem solver. As a senior software engineer at the professional networking service LinkedIn, he leads a team that supports and improves internal software development tools used by every LinkedIn engineer. And as a concerned parent, worried about what climate change will mean for his children's future, he sees a wide gap between what science tells us about global warming and what people understand. So, he wrote and published a book about climate change titled *Never Were*. And he became a supporter of the Union of Concerned Scientists.

"Climate change is such a complicated beast," Lai says. "People have to be able to grasp its consequences. We need translators who can explain technical concepts so they can be shared democratically. UCS is seen by many people as a definitive source of information. It's a great source for educating ourselves."

Last year, Lai and his coworker Neha Jain, a software engineering manager equally passionate about climate change, worked together to raise funds for UCS through a LinkedIn initiative that donated three dollars for every one dollar that employees contributed. "You've got to enlist as many people as you can," says Lai. "When I see that UCS is working on policy and legislation, and promoting renewable energy in a variety of states, and also fighting back against what President Trump and his administration are trying to do, it's like David versus Goliath."

FOR FUTURE GENERATIONS

Lai says he and Jain plan to keep rallying their colleagues and others to support UCS. "If you care about what happens five years or 10 years from now, then you have to care about climate change. And if you do, UCS is one of only a few institutions that carry the flag for fighting climate change with information and resources."

Frame the problem correctly, Lai says—as UCS works to do—and people will come together to solve it. "If we screw up this planet, it's not something we can easily reverse," he says. "We're either going to make life really hard for our descendants, or not. When we recognize that, people can begin to cooperate and throw themselves into solving hard problems. We can achieve amazing results." {C}

Far from the Coast, Floodwaters Rage

By Astrid Caldas

When we think of flooding, those of us who live near the coast might naturally picture storm waves overwhelming shorelines and sending water flowing onto streets and into homes, such as we saw in coastal communities in North and South Carolina with the recent devastation wrought by Hurricane Florence. But inland flooding is actually the most common type of natural disaster in the United States, and earlier this year, many landlocked communities such as Elkhart, Indiana, and Millville, West Virginia, were hit by dangerous and expensive floods that threatened—and in some cases, claimed—people's lives, triggered evacuations, damaged infrastructure, and cost millions in rescue and cleanup operations.

In 2017 alone, inland US floods killed 25 people and caused more than $3 billion in property damage and ruined crops. Worse still, these floods are becoming more frequent and more destructive in some parts of the country. My team's new fact sheet *Climate Change, Extreme Precipitation, and Flooding: The Latest Science* answers the questions inland residents might have about increased flooding, such as: Why is it happening? Is it because of climate change? And what can we do to prepare for more frequent and severe floods?

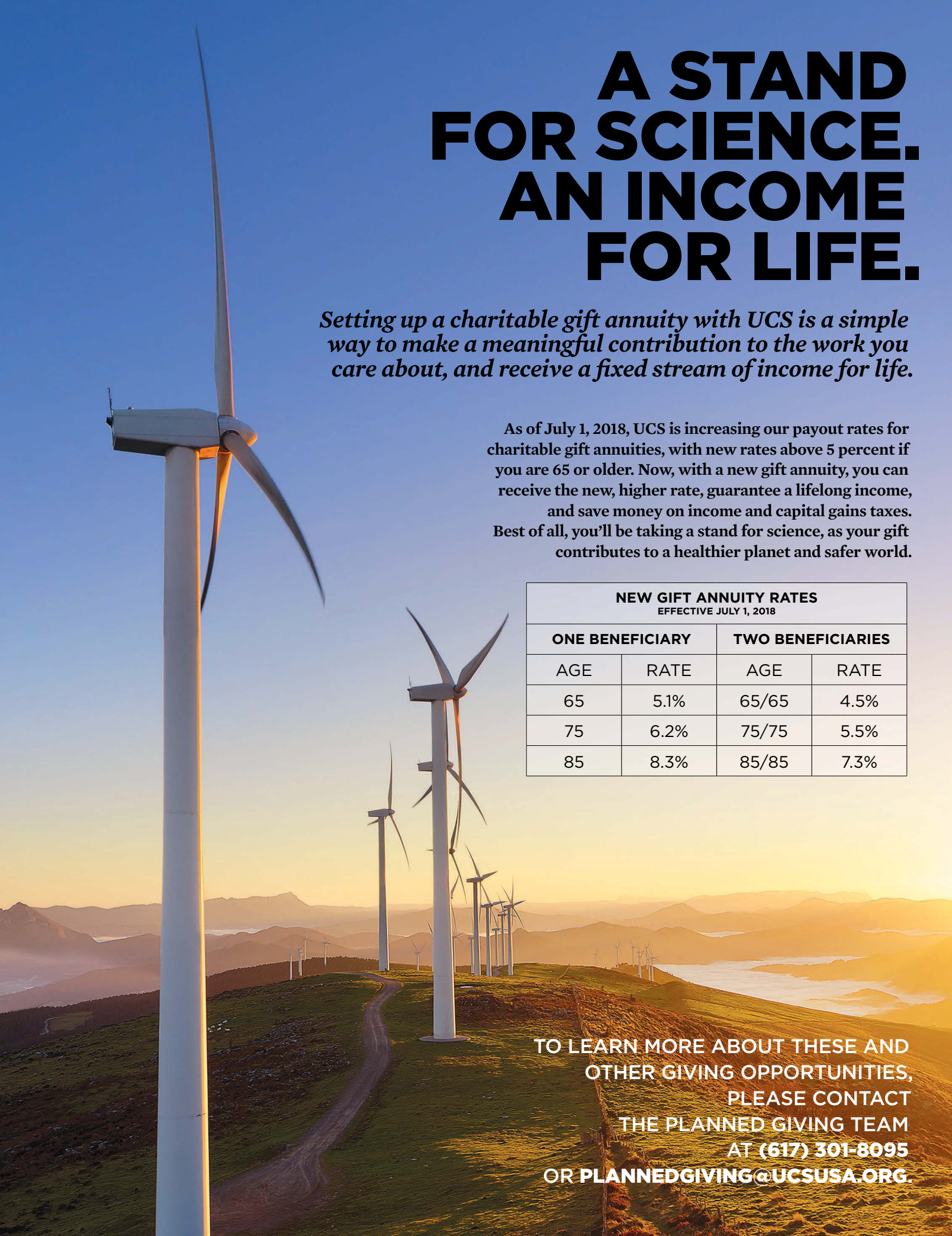
Flooding is a natural process that occurs when rivers or land don't have enough capacity to absorb or drain large amounts of water from rain or melting snow. We've always experienced floods, but we haven't always seen rainstorms with the frequency and intensity we are experiencing now, which often contribute to increased flooding. Nor have we always used our land the way we do today, allowing building in wetlands and covering vast tracts with nonporous asphalt. These two factors—increased extreme precipitation and changes in land use—contribute to worsening floods in certain US regions, especially the Midwest and Northeast.

Inland flooding affects thousands of homes and businesses around the country every year. Here, a December 2015 storm inundated towns in and around St. Louis, Missouri.

Scientists are working now to better understand the links between extreme precipitation and climate change. Although some intense rainfall occurs as a function of natural variability, warmer air holds more moisture, so global warming can make increased rainfall more likely. In our analysis, however, we don't just advocate for better policies to mitigate global warming—we make the case that preparedness is key. Because warmer temperatures will continue to drive heavier rainfall, triggering more frequent and intense floods in some areas of the United States, state and local governments must adopt science-based and commonsense land-use standards that protect wetlands from development, keep people and buildings out of harm's way, and ensure that all new infrastructure is climate-resilient. {C}

***Astrid Caldas** is a senior climate scientist at UCS. Read the full fact sheet—along with concrete suggestions for your local decisionmakers—at* www.ucsusa.org/floods*, and read more from Astrid on our blog,* The Equation*, at* https://blog.ucsusa.org.

Photos: Sammi Gaines/UCS (Astrid Caldas); J.B. Forbes/St. Louis Post-Dispatch via AP (flooding); mimadeo/Adobe Stock (ad)



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