EDF ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

Solutions

Vol. 50, No. 2 / Spring 2019

Power in the prairie

America's prairie once supported an abundance of wildlife. Then it became the world's breadbasket. EDF is helping restore the balance between agriculture and the environment.

Page 8

A big personality

Goliath groupers — which can weigh up to 600 pounds and emit booming sounds as loud as a jet engine — have been fished to near extinction in the Caribbean. One of the few places they're still abundant is the Gardens of the Queen, an archipelago off the southern coast of Cuba. Thanks to research led by Cuban marine biologist Dr. Fabián Pina Amargós (pictured), who has worked with EDF for a decade on the science of marine protection, Cuba took a major step in 2018 by banning all fishing of these charismatic behemoths.

NOEL LOPEZ FERNANDEZ

A turning point on climate change

The past two years have been a mercilessly tough time for the environment, with climate action and other protections under attack in Washington, DC. But now, finally, we are reaching a turning point.

Many voters had the environment in mind last November, and the new House leadership will mean better oversight of the EPA's actions. For the past four years, Congress abdicated its duty to lead on climate policy. Those who denied climate science were in charge. Now things are changing.

On February 6, the House held its first climate hearings in more than eight years (see p. 13). The next day, Sen. Ed Markey (D-MA) and Rep. Alexandria Ocasio-Cortez (D-NY) introduced their Green New Deal resolution, including a 10-year mobilization to cut carbon emissions.

The Green New Deal brings a level of energy and ambition equal to the problem we need to solve. That's good for the climate debate. As to the policy and scope of climate legislation, not surprisingly there are differences. That's healthy and necessary. The policies to achieve the significant reductions we need must be crafted in a way that wins broad bipartisan support in Congress, so they will be durable over time.

The renewed attention to climate in Washington comes not a moment too soon. Last year, the fourth hottest on record, brought extreme weather that cost 247 American lives and caused nearly $100 billion in damage. People are paying attention. The latest survey by the Yale Program on Climate Change Communication finds "a large majority of Americans think global warming is happening, outnumbering those who don't by more than 5 to 1."

New technologies add to my hope that we can reverse the rise in emissions soon. Our satellite mission, MethaneSAT, on track to launch in 2021, will help achieve EDF's goal of cutting methane emissions from the oil and gas industry 45 percent by 2025 (see p. 14). The global aviation industry has agreed to cap emissions from international flights in just two years (see p. 16). And new agricultural practices are helping farmers reduce emissions and store more carbon in the soil (see p. 8). In addition, on the horizon we see a growing number of negative emission technologies, or NETs, that could remove existing greenhouse gases from the atmosphere — as we'll need to do for climate stability in decades to come.

With public opinion moving in a positive direction, new technologies close at hand and the Green New Deal shaking up Washington, the momentum for serious action on climate change is building. There's no time to lose.

Fred Krupp
EDF President

EDF ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

Environmental Defense Fund's mission is to preserve the natural systems on which all life depends. Guided by science and economics, we find practical and lasting solutions to the most serious environmental problems.

Our work is made possible by the support of our members. Donate online at edf.org/newsletter or by mail: EDF, Attn.: Member Services, 1875 Connecticut Ave. NW, Ste. 600, Washington, DC 20009

On the cover: Native grasses improve soil structure between grain fields in Iowa. Contour strips prevent erosion and woodland provides habitat for native species. EDF helps establish these measures and more in the Corn Belt in a drive to protect wildlife and water, regenerate soils, and improve the Heartland's ability to withstand climate change. *Solutions* Managing Editor Tasha Kosviner examines the changes taking hold on America's prairies.

COVER: GETTY IMAGES

Solutions

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FIELD NOTES

VINNIE FALLICO

States charge ahead on EVs

With U.S. coal-burning electric power plants in decline, transportation has become the nation's largest source of carbon dioxide pollution.

Cutting emissions from transportation isn't easy. More people are buying clean electric vehicles today than ever before, with 2018 EV sales up 81 percent over 2017. But gas-guzzling trucks and SUVs still dominate the market.

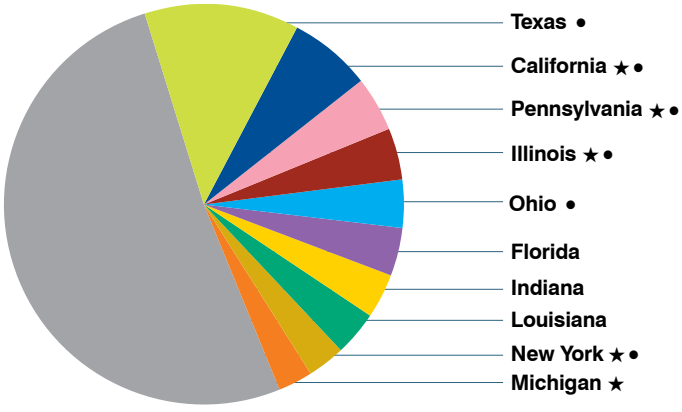
With President Trump trying to roll back federal clean car standards, many states are giving electric vehicles an extra push. California leads the pack: Los Angeles alone has 1,800 EV charging stations, and the state far outpaces all others in EV sales.

Nine northeastern states and the District of Columbia have pledged to develop a cap-and-trade policy to slash emissions from transportation. In Colorado, newly elected Gov. Jared Polis (D) directed the state air commission to consider adopting California's zero-emission vehicle standards.

New York State has committed $250 million to accelerate the adoption of EVs, and in New York City five fully electric school buses, the first of their kind, have hit the road. EDF pushed state utility regulators to adopt the plan, and an EDF Climate Corps fellow helped Con Ed develop its EV charging strategy.

BIG EMITTERS STEP UP ON CLIMATE

Just 10 states are responsible for almost half of all U.S. greenhouse gas emissions. Five of these top emitters have set statewide GHG reduction goals (★). EDF has active pollution-reducing projects in six of them (●).



SOURCES: WRI, CCES

Japan tackles fishery reform

Japan is the world's seventh-largest fishing nation, but its catch has fallen by two-thirds in the past three decades.

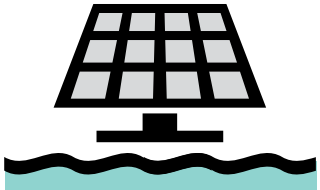
To help fisheries recover, Japanese lawmakers enacted in December the most significant reform of their country's fisheries laws in 70 years. EDF provided expert scientific and policy support to government officials, scientists and regulators for the reform.

The reform incorporates several EDF recommendations, including greater reliance on science-based catch limits and a requirement to develop recovery plans for overfished stocks. "These changes could signal a meaningful shift in how other countries in the Asia-Pacific region manage their fisheries," says EDF's Japan Director Kazuhiko Otsuka.

JULIAN RANKIN/WALTER ANDERSON MUSEUM

Everyone's Gulf

EDF has partnered with renowned chef and Share the Gulf co-chair Nick Wallace to promote healthy fish diets and awareness of conservation. The Everyone's Gulf project — focused on schools in low-income, underserved communities in the South — will include training and field trips to examine how sustainable seafood is caught in the Gulf of Mexico. The project aims to empower kids, parents and school staff to become advocates for sustainable fisheries management. "Everyone should have access to fresh, real food," says Wallace.



Floating solar panels on just a fraction of lakes and ponds could generate almost

10%

of U.S. electricity.

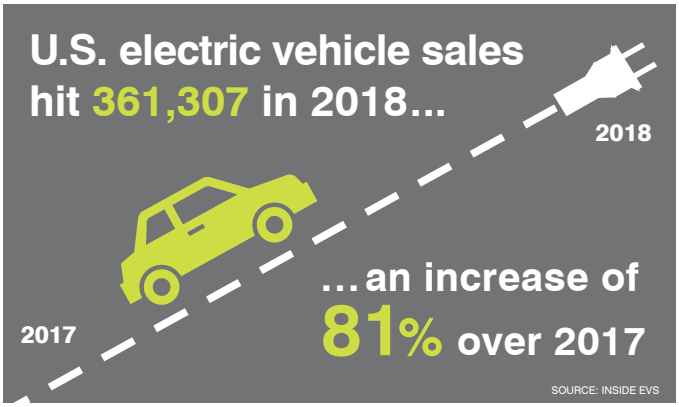
SOURCE: NATIONAL RENEWABLE ENERGY LABORATORY


GETTY

A carbon-free utility for the U.S. heartland

Xcel Energy, a utility serving more than 3 million customers across eight states, has committed to cut carbon pollution 80 percent by 2030 and go carbon-free by 2050. It's the boldest climate commitment yet from any power company, and all the more significant because Xcel operates in the middle of the country — where other utilities are lobbying fiercely to keep outdated, dirty coal plants operating. EDF President Fred Krupp called Xcel's decision "an act of true leadership."

When EDF General Counsel Vickie Patton first knocked on Xcel's door 20 years ago, the company was fighting clean air laws. Now it's one of the nation's leading wind energy providers. Xcel has made plans to retire several coal plants, including in Colorado, where they're investing billions in wind, solar, energy storage and clean energy jobs while saving customers money. As Xcel extends its clean power push across the middle of the country, it paves the way for other red-state utilities to take climate action.



EPA backtracks on toxic chemical

In 2016, EDF notched a victory when Congress overhauled the nation's chemical safety law. The Environmental Protection Agency, flexing its new muscles, then proposed to ban paint strippers containing methylene chloride, which have killed dozens since the 1980s.

But in the era of Donald Trump, every victory is precarious. In a concession to industry, the EPA last year sent to the Office of Management and Budget for final review a rule that would scale back the ban. The agency proposed to limit the ban to consumer uses only, even though most of those killed have been workers. In March, the EPA finalized a partial ban, leaving workers in jeopardy. EDF will fight for a ban that protects both consumers and workers.

GETTY

"Our coast is disappearing. And this loss affects me." An EDF ad during the Super Bowl featured kids from across Louisiana urging policymakers to act on the state's land loss crisis. Louisiana loses the equivalent of a football field of coastal land every 100 minutes. "Decision makers need to hear directly from those most affected," says EDF campaign director Steve Cochran. bit.ly/2t2Xd

EDF PEOPLE

Isabel Mogstad, methane sleuth

What are you working on?

New technologies to detect and manage methane leaks at oil and gas fields. These include drones and planes, low-cost sensor networks and, increasingly, technologies like machine learning and the industrial Internet of Things.

That sounds futuristic.

It is! It's part of what we call the Fourth Wave of environmental innovation. Digital tools are fundamentally transforming how oil and gas companies do business. My job is to make environmental management an integral part of that.

How can we speed up action on methane?

Methane causes at least 25 percent of today's warming, and leaks are a real challenge. We need sensible regulation and for the world's largest oil and gas companies to act.

What is the biggest threat to the environment?

Complacency.

Tell us something surprising.

I'm at my happiest when I'm out in an oil field in a hard hat and steel-toe boots. As a liberal arts graduate hailing from New York City, this still surprises me!

PAT SULLIVAN/AP

The trillion-gallon problem

By Shanti Menon

Across America, a flood of polluted wastewater from oil and gas operations is looking for places to go. EDF is figuring out how to treat and dispose of it safely.

NICHOLE SAUNDERS, A LAW student in Tulsa, Oklahoma, was studying at her desk late one night in 2011 when the walls started shaking. A 5.7 earthquake — one of a series of unprecedented tremors resulting from oil and gas industry activity — was rocking the state. Saunders was unnerved. "Once we had tremors and a tornado warning at the same time. I didn't know if I was supposed to stay inside or run out."

Scientists linked Oklahoma's sudden jump in earthquake activity to pressure from wastewater injected into underground disposal wells by the oil and gas industry. The state limited those injections, but the volume of wastewater has been rising rapidly nationwide. The industry now produces a trillion gallons of it every year — enough to fill more than a million Olympic swimming pools.

Saunders, who now works for EDF, found herself tackling wastewater problems from day one on the job. As disposal space grows costlier and more limited in parts of the West, the industry is casting about for new ways to handle this polluted stream of waste.

This year, the EPA and water-stressed states such as New Mexico, Oklahoma and Texas could open the door to all kinds of wastewater disposal and reuse, including expanding the discharge of treated wastewater into rivers and streams and reusing treated wastewater on lawns, golf courses, ranches and farms. Some have even considered using it to replenish drinking water supplies.

There's one mega-problem: Nobody really knows what's in this water.

Without an understanding of what's in wastewater or how to clean it, risky proposals to discharge or reuse it could threaten precious groundwater, crops, livestock and people's health across the parched American West. Saunders and other EDF experts are spearheading a broad movement to investigate wastewater and examine the risks before state and federal authorities open the spigots.

Science raises red flags

In hard-rock formations such as the Permian Basin, which straddles Texas and New Mexico, oil and gas companies extract petroleum by injecting billions of gallons of water mixed with chemicals into the rock at high pressure.

The wastewater that comes out the other side can contain more than 1,000 chemicals, including cancer-causing arsenic and benzene. Some of these occur naturally underground, others are purely industrial.

"The wastewater can be salty, thick, viscous and radioactive. Pretty gnarly stuff," says EDF scientist Cloelle Danforth.

In the 1920s, wastewater released directly onto Texas soil created the Texon Scar, a patch of blighted earth visible from space. Cleanup of the scar is still

> **"It can be salty, viscous, radioactive. Pretty gnarly stuff."**
>
> —EDF scientist Dr. Cloelle Danforth

ongoing today, nearly 100 years later.

The composition of wastewater varies from well to well. Samples are hard to get and difficult to analyze. Some of the chemicals used are industrial secrets.

Three years ago, EDF convened a panel of researchers, industry experts and government officials to discuss the growing wastewater problem. This early intervention kicked off a spate of new research, and today EDF and more than a dozen academic partners are beginning to shed light on what's in the water, how toxic it might be and how various treatment technologies could perform.

Danforth is helping to put together a database of all wastewater chemicals detected thus far. Of the 1,200 chemicals listed to date, most are not well studied, and some have not been evaluated at all. This makes it difficult to determine when wastewater is clean enough to discharge and what impacts it might have on a farmer's fields, a rancher's cattle, fish in a river or drinking water.

Rushing to reuse

Even as the science begins to raise red flags, research is being outpaced by the rapid rise of water-intensive drilling in places like the Permian Basin. Some in the industry want to rush into wastewater reuse and discharge now, seeing a window of opportunity in today's industry-friendly EPA led by Andrew Wheeler. The safeguards that regulate wastewater discharge were created decades ago, when the industry discharged relatively little. This summer, the EPA will decide if it's time to reconsider the rules.

"The current protections are already weak," says Saunders. "There's a risk the EPA could make them weaker."

For the moment, there's enough room to handle wastewater with disposal wells that are properly located, designed and monitored to avoid groundwater pollution and earthquakes. In the future, more water could be recycled on-site, and eventually, with a lot more science and strong state and federal safety standards, it could be treated and reused in ways that minimize environmental risks.

Not everyone is willing to wait. An entrepreneurial ex-rodeo clown in Wyoming claims he can treat wastewater for crop irrigation, and is gearing up for a state-authorized test on a wheat field. In the Permian Basin, organizations eager to explore wastewater treatment and reuse have sprung up like Texas wildflowers. A recent joint paper from the EPA and the state of New Mexico renames oil field wastewater as "renewable water."

In this Wild West of water pushers, drought and environmental rollbacks, all options appear to be in play. But with so many unknowns, there's no way to be certain that treated wastewater is clean enough for these new purposes. EDF and partners are bringing science and accountability to the process, developing tests that could be used to help improve clean water standards and perhaps create options for less risky reuse of wastewater in the future.

Saunders is bringing the latest research to the Groundwater Protection Council, a national organization of state agencies, where she's helping to author a defining report on wastewater.

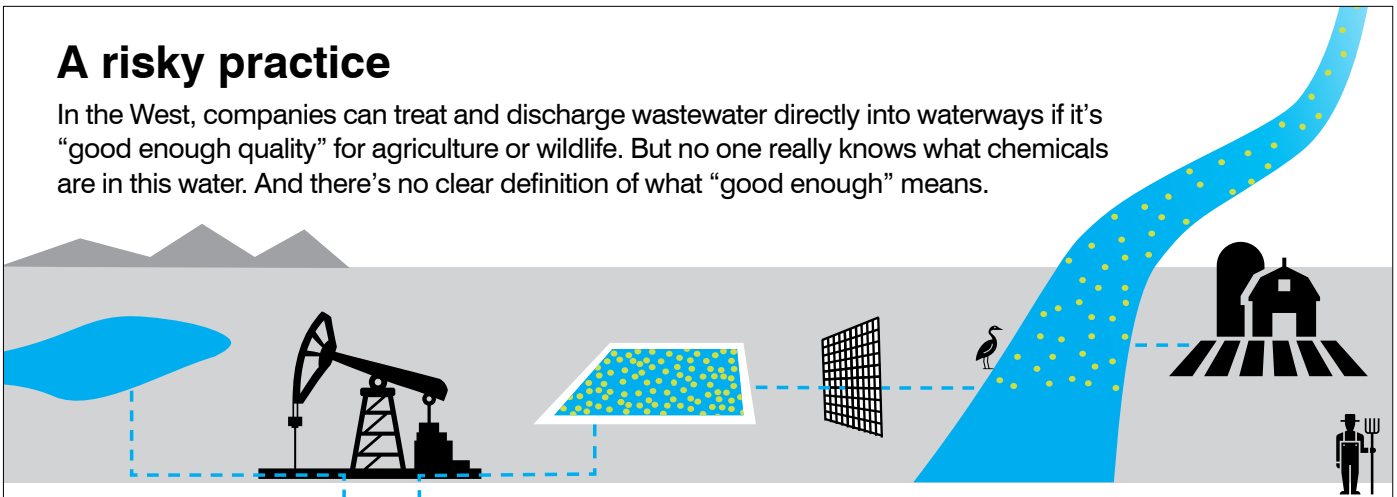
"There's a lot of enthusiasm to use wastewater," says Mike Paque, the head of the council. "We're on the front end of a long, dry period. And we're not making any more water. But we need to balance this enthusiasm by asking the right questions about what's in the wastewater and what we need to do to treat it. That's what EDF brings to the table."

Saunders and her colleagues are knocking on doors all over oil and gas country, urging the industry, lawmakers and landowners to focus on recycling wastewater on-site and avoid riskier options until there's more information. As the rules governing wastewater open to change, Saunders hopes communities will consider how their property and families could be affected for decades to come.

"We recognize there's a thirst for water, " says Saunders. "But let's get the facts right. Let's be smart about this."

A risky practice

In the West, companies can treat and discharge wastewater directly into waterways if it's "good enough quality" for agriculture or wildlife. But no one really knows what chemicals are in this water. And there's no clear definition of what "good enough" means.



Water mixed with chemicals helps release oil and gas.

Polluted wastewater comes out the other side.

"Treated" wastewater is discharged into waterways.

It can end up in farms, drinking water sources and wildlife habitat.

Seeds of change

By Tasha Kosviner

Farms in the Midwest have been devastated by flooding and climate science tells us there's even worse to come. EDF is strengthening communities and the environment in turbulent times.

THIS SPRING, AS HISTORIC floods swept the Midwest devastating farmland, destroying crops and causing upwards of $3 billion in losses, EDF's director of agricultural sustainability, Suzy Friedman began making calls. She wanted to check in on our farming allies — the driving forces behind EDF's conservation work across the Midwest — to see how they were weathering the flood.

At about the same time, EDF was convening another emergency meeting in California, where the monarch butterfly population is in danger of extinction. Scientists, land managers and officials have launched a campaign to save the monarch, whose population has suffered a decades-long trajectory of decline. The situation is so dire the species faces a possible endangered species listing this June.

At first, it may seem these two events have nothing in common. But at their heart is a common cause: climate change. Changing weather patterns are creating periods of more intense rains, harsh droughts and late-season freezes, all of which exacerbate floods. The delicate monarch butterfly, whose phenomenal migration from Canada to Mexico relies upon habitat in the Midwest, has been unable to adapt to the extreme weather and the food scarcity that accompanies climate change.

But there's still hope. We have a powerful survival tool at our disposal: the

land. If we can help farmers manage it more lightly, they can unlock a more resilient future for themselves, the monarch, and entire ecosystems.

A changed landscape

For millennia, the prairie lands that stretched from southern Wisconsin to western Montana and from central Texas to Canada were in perfect balance. Grasses rippled across the landscape and bison, elk and deer roamed among creeks, prairie potholes and wetlands, which swelled and subsided with the seasons.

Today the prairie has all but disappeared. Tremendous postwar advances in technology and mechanization has turned this sprawling landscape into one of the most productive agricultural regions in the world. Thousands have been lifted out of poverty and American agriculture has become the envy of the world. But all this has come at a cost.

As vast fields of grain crops replaced prairie, we lost huge natural ecosystems that supported a diversity of plants and animals, including the monarch butterfly. Years of tillage has led to erosion and released more carbon into the air. And the loss of natural ponds and wetlands has reduced the land's ability to hold water, increasing the risk of drought during dry spells and flooding during times of intense rain.

There have been other impacts too. While technological breakthroughs in fertilizers and pesticides increased productivity, they also contributed to increased nutrient runoff, sending climate pollution into the air and nitrogen and phosphorus into the water, worsenin dead zones like the one that killed 267 tons of marine life in the Gulf of Mexico last August.

"Our human and natural ecosystems are intricately interdependent," says EDF Senior VP for Ecosystems David Festa. "But this delicate balance has been dangerously compromised."

There is nothing farmers could have done to prevent this season's historic deluges, which were caused by late-season snowfall, rapidly melting snow, and rain falling on already saturated, frozen ground.

But there are things they can do to recapture some of the power of the prairies, improving their ability to withstand the coming weather extremes and helping regenerate entire ecosystems of the Midwest.

Landscape-wide restoration

On Oxbow Farm outside Des Moines, Iowa, Ruth Rabinowitz walks along a wide strip of insect-rich prairie. To her right, the corn rises yellow and dense, to her left, prairie rolls down to a glassy creek.

"Seeing the land flourish like this is a heart and soul thing for me," she says.

Things weren't always so positive. When Rabinowitz became a manager on her family's 1,650-acre corn and soybean farm in 2013, the earth was eroded, the soil poor, the waterways ploughed in. As a result, the land had become unproductive and wildlife had all but disappeared.

Rabinowitz got to work. She created 40-foot buffers along the edge of fields, to capture runoff and protect the soil. Planted with native grasses and wildflowers, they also became valuable habitat for insects. She created new ponds which improved the land's ability to hold water,

preventing runoff and erosion and providing new habitats for amphibians and migrating waterfowl. She improved soil health by using cover crops.

Today, one-quarter of Rabinowitz's land is under conservation programs. Monarchs, bees, deer, waterfowl and

> **"Our human and natural ecosystems are interdependent, but this delicate balance has been dangerously compromised."**
>
> — David Festa, EDF Senior VP for Ecosystems

AUDREY ARCHER

pheasants have returned. Water loss and erosion are less of a problem. And — the goal of any farming business — the land is beginning to give back.

"There has been a huge transformation in the quality of our topsoil," she says. "And that has made a difference to our bottom line."

EDF is now working to roll out innovations like Rabinowitz's across entire working landscapes.

This does not mean an end to intensive farming. With the global population expected to reach 10 billion by 2050, the world's food production will need to rise by half in the next 30 years to sustain it. To feed that many people, we need to make the best possible use of the land now devoted to food production. And that means helping farmers get the tools and resources they need to operate in ways that benefit both themselves and the environment: creating wildlife habitat on marginal lands, protecting and restoring natural waterways, using fertilizer more efficiently, and seeing themselves as part of a wider landscape.

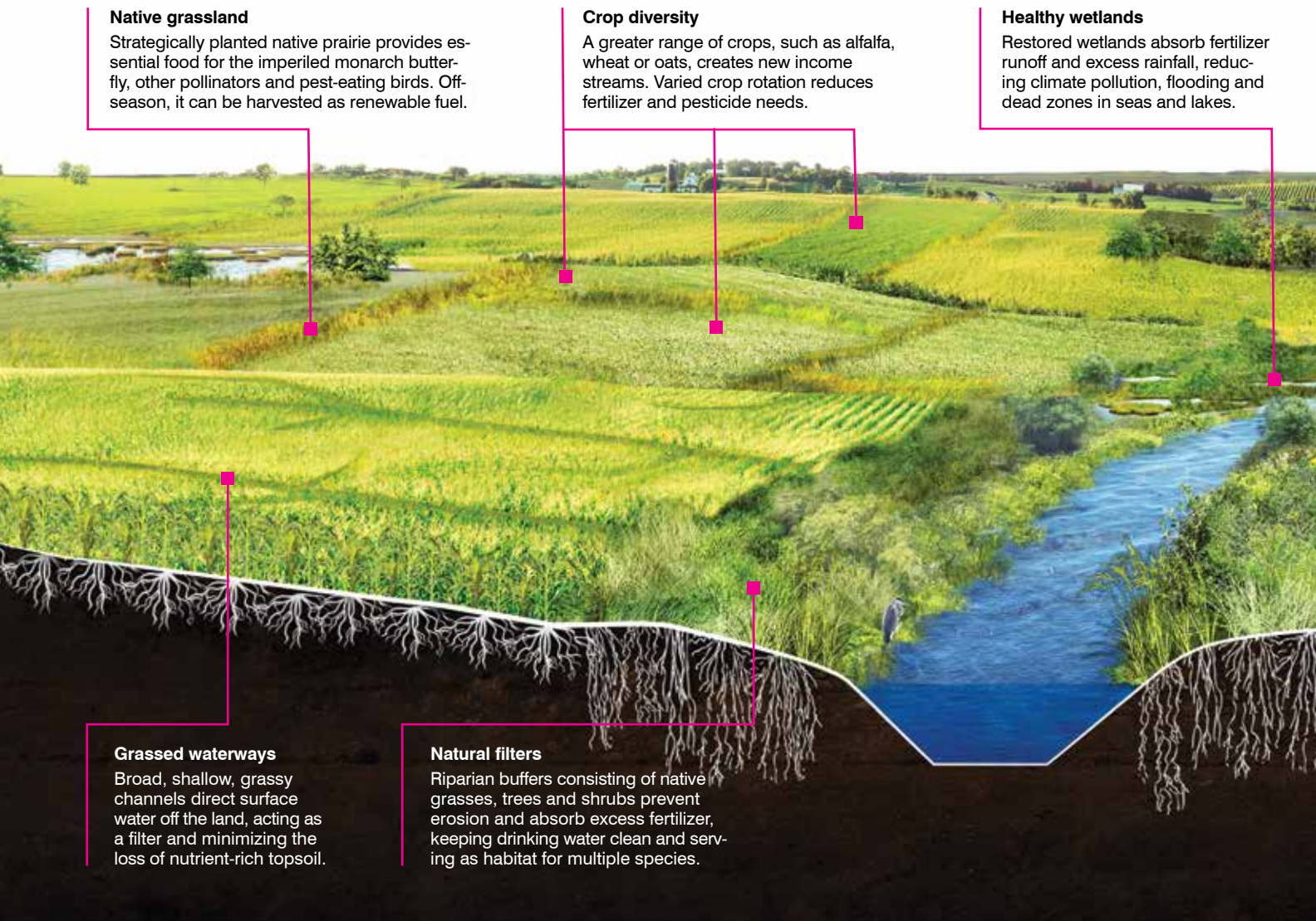
"Increasingly, farmers are recognizing the need for more sustainable agriculture," says EDF's Suzy Friedman. "They are our best partners in advancing food and conservation goals."

In partnership with farmers, policymakers and others, EDF will help expand conservation practices across 45 million acres by 2022. To further this goal, we've partnered with the National Corn Growers Association, which represents 300,000 farmers, to take sustainability measures to the necessary scale.

"EDF has persuaded us to move in directions I didn't know were possible

Landscape in harmony

For working landscapes to thrive, they must be in balance with the natural world. In the Corn Belt, EDF and our farmer partners are working toward a shared vision: a land that brings prosperity, feeds a growing population, supports diverse species and is resilient in the face of a changing climate.



or practical," says Iowa grain farmer Bill Couser, an association member.

We've also launched monarch habitat conservation projects in California, Iowa, Missouri and Texas, with the goal of restoring 1.5 million acres by 2028. The projects provide monarchs with vital habitat while also decreasing fertilizer runoff and improving soil health.

Through EDF's Monarch Butterfly Habitat Exchange, farmers like Rabinowitz and ranchers like Amy Greer of Brady, Texas, are creating new habitats on their property. Our goal is to create a market in habitat restoration in the near future.

"Owners of working lands must play a role in the survival of threatened species," says Greer. "EDF habitat exchanges allow us to do this."

Smithfield Foods, the world's largest pork producer, has also joined the fight, committing to restoring monarch habitat with EDF's help.

On the policy side, EDF helped win strong conservation measures in the 2018 bipartisan Farm Bill, which supports soil health and carbon sequestration and sets aside $25 million a year to test innovative conservation approaches.

The climate factor

Fortunately none of our farm advisors in the Midwest were seriously impacted by this season's floods, but future threats loom large.

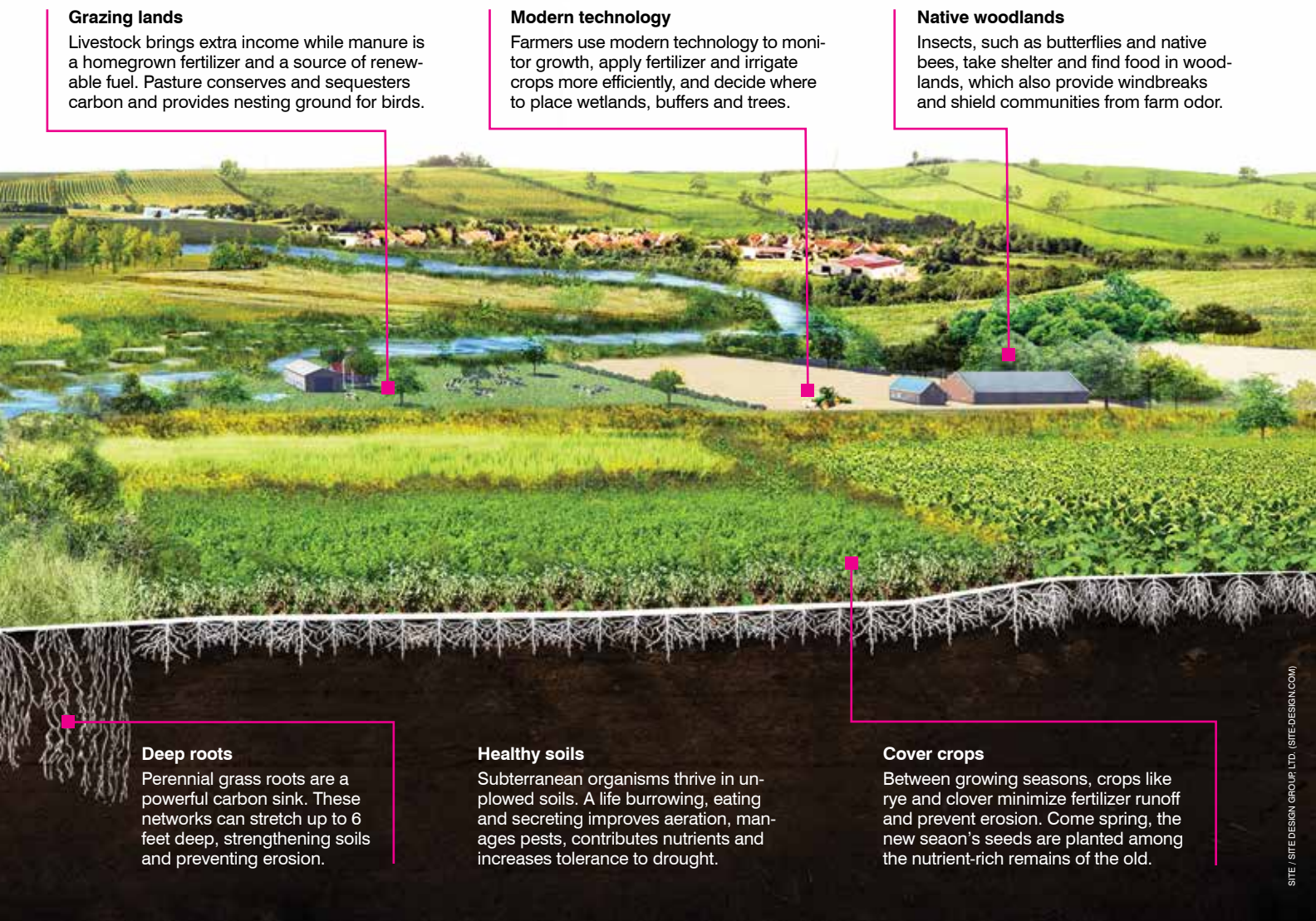
Last year's National Climate Assessment warned of specific dangers to Midwestern agriculture, including drought-related water shortages and an influx of pests, as well as more soil degradation and water quality issues due to increased runoff caused by heavy rains.

"Any change in the climate poses a major challenge to agriculture," the authors wrote. "Rural communities ...are particularly vulnerable."

Greater resilience isn't the only reason farmers need to act. They also have a role to play in helping limit the changes to come. In the United States, agriculture contributes 9% of greenhouse gas emissions through methane from livestock, nitrous oxide from fertilizer and carbon dioxide from the loss of perennial plants, such as native grasses and wildflowers, that hold carbon in the soil.

"We can't afford to continue the way things are," Festa says. "The losses are too significant, putting communities and agriculture itself at risk."

As for Rabinowitz, she is now one of EDF's growing band of farmer ambassadors, experts who use their deep knowledge and love of the land to spread the word about conservation farming and interconnected solutions.



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SHUTTERSTOCK

Lifting London's fog

Air pollution is deadly. Every year, it makes tens of millions of people sick — contributing to cardiac arrest, asthma and other respiratory illnesses — and is responsible for some 7 million premature deaths globally. That's more than HIV/AIDS, tuberculosis and malaria combined.

Since the most pervasive air pollutants are invisible to the eye, so are the risks. But now, a new initiative is making these invisible threats visible, and setting an example for cities around the globe. In January, the Mayor of London, Environmental Defense Fund Europe, the C40 Cities network of more than 90 cities tackling climate change, and other partners launched Breathe London. The ambitious project will measure and map Londoners' daily exposure to air pollution, using a network of advanced pollution sensors deployed across the city.

Breathe London will create the world's most sophisticated air monitoring system, shining a light on pollution at a hyperlocal level and providing data that lets people not only see the problem, but also take action to solve it. London Mayor Sadiq Khan was not exaggerating when he declared that his city's air quality problem "is leading to the premature deaths of thousands of Londoners every year."

To drive action, EDF and partners launched the world's most sophisticated urban air pollution monitoring system.

Says Londoner Bo Ruan: "One of my daughters, who is three, developed pollution-aggravated asthma about a year and a half ago. I'm worried that this is affecting a whole generation of children."

Putting people in charge of their air quality

Breathe London started with the deployment of 100 low-cost air quality monitors throughout the city, each equipped with up to 10 types of sensors. Next, Google Street View cars equipped with state-of-the-art sensor technology will sample the air repeatedly along 1,000 miles of London roads. EDF already has used this mobile mapping strategy effectively in Houston and Oakland, California.

Together, these fixed and mobile sensors will provide an unprecedented amount of information, showing Londoners a real-time picture of the air they're breathing as they move around the city. More and better data will also lead to better air pollution forecasting, more responsive policies and, ultimately, healthier air. For example, localized air quality data could lead to road access restrictions for the dirtiest vehicles at times of high pollution across the city or in the most polluted neighborhoods.

"We are going to get the most detailed picture of air pollution in London ever," says Bryony Worthington, executive director of EDF Europe. "This will provide information for the public and decision makers that can drive solutions to a problem that affects every Londoner."

London is just the beginning. This new model can be adapted and replicated in cities around the world. We look to the day when detailed, street-by-street maps of air pollution are available in almost any city. But monitoring alone doesn't save lives: It must trigger strong pollution control measures such as those that London will be testing.

EDF is committed to helping the 90-plus cities in the C40 network use these new tools to diagnose air pollution problems, design solutions and share results.

It's part of what we call the Fourth Wave of environmental innovation, helping people take action to improve air quality, protect public health and slow climate change.

Peter Edidin

CLIFF OWEN/AP IMAGES

Bipartisan climate hawks, Governors Roy Cooper (D-NC) and Charlie Baker (R-MA)

Congress wakes up to the climate threat

LONG OUT OF THE SPOTLIGHT ON Capitol Hill, climate is back. For the first time in years, Congressional committees are holding climate hearings. A resolution called the Green New Deal is generating tremendous excitement and debate. Polling now suggests a solid majority of Americans are strongly in favor of 100 percent clean energy.

The renewed dialogue comes against a backdrop of anti-climate moves by the administration, such as proposing to roll-back standards for cars and power plants.

The administration's climate assault is opposed by most Americans, who accept climate science and support federal action. Candidates have noticed. Many Democratic candidates are focusing on climate, and Republicans are increasingly comfortable talking about it.

"Candidates who don't make climate central to their campaign are not operating in the new political reality," says Joe Bonfiglio, president of our political affiliate EDF Action.

The new Congress is exercising oversight. In February, the House Subcommittee on Environment and Climate Change held its first hearing on climate in six years, detailing the costs of inaction. EDF provided members with science research to prepare them for the hearing. Tellingly, the witnesses called by Republicans were not outright climate deniers, as in the past — a sign that public opinion is shifting.

Nowhere is this shift more noticeable than in the House Science Committee, whose past chair promoted climate conspiracy theories and harassed climate scientists by subpoenaing their emails. At a February hearing, under the new chair, all the witnesses accepted climate science, and the Republicans even invited a witness who supports a carbon tax.

There's movement in the Senate as well. In March, under Alaska Sen. Lisa Murkowski (R), the Senate Energy and Natural Resources Committee held its first hearing on climate since 2012. Murkowski noted that climate change was profoundly affecting her constituents. Ranking member Sen. Joe Manchin (D-WV) acknowledged the reality of climate change and stated, "Its impacts are felt in every community." Notably, both senators represent states heavily reliant on the production of fossil fuels.

EDF has also gone to court to oppose the administration's climate rollbacks. We've filed more than two dozen lawsuits in defense of bedrock protections, including clean car and clean power standards, as well as health protections such as mercury standards for power plants.

We're also working in the states, the incubators of progress. Colorado, with support from EDF, recently adopted California's more stringent clean car standards, while New Mexico has embarked on ambitious cuts in climate pollution. New governors in Maine, Illinois, Michigan and New Mexico have joined 19 other states in vowing to uphold the Paris climate accord.

Legislators in California and Hawaii have set deadlines for utilities to get 100 percent of their electricity from zero-carbon sources by 2045. Oregon is moving forward with cap-and-trade legislation to cut carbon pollution, with help from EDF and a broad coalition of allies.

Does this mean we'll see bipartisan climate action in Congress anytime soon? Not yet. But the tide is turning.

"The climate logjam is breaking up," says EDF Senior VP for Political Affairs Elizabeth Gore. "And when this issue gets moving, it's going to move fast."

Charlie Miller

GETTY

Hawaii has vowed to switch to 100 percent zero-carbon energy by 2045.

FOTO SEARCH

Mission to Earth

By Shanti Menon

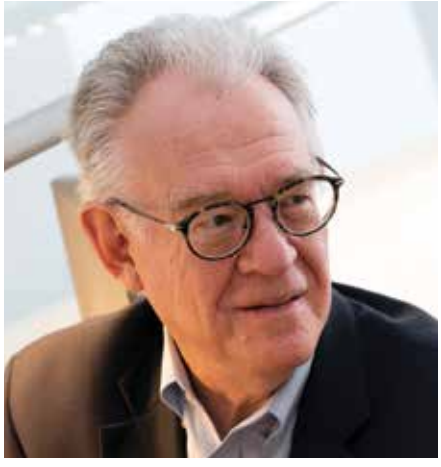
He explored Mars. Now this visionary is helping EDF fight global warming from space.

As chief scientist of the famed Jet Propulsion Lab and architect of NASA's Mars Exploration Program, Dan McCleese helped pioneer a new age of innovative, high-performance space missions. He even has a piece of the cosmos named after him — the Mars-crossing asteroid 5641 McCleese.

But as Earth moves dangerously closer to runaway climate change, this space veteran is no longer content to be an observer. He left JPL to tackle climate issues head on and now leads an international team of scientists helping EDF guide the development of MethaneSAT.

Scheduled to launch in 2021, this satellite will measure human-caused emissions of methane worldwide with unprecedented precision, helping to tackle this potent climate pollutant.

McCleese sat down with EDF to discuss this new mission: deliver the data the world urgently needs to slow down global warming in our lifetime.



VICTORIA WALL HARRIS

Dan McCleese: from observation to action

Why did you decide to join the MethaneSAT team?

I wanted to do something relevant to the here and now. This mission is one of those rare opportunities to make a difference. We know that methane is responsible for at least 25 percent of today's warming. Reducing methane emissions will have an impact in a matter of years, not decades. But scientists don't always understand how to get people to act on their data. That's where EDF has proven to be superb. MethaneSAT is focused on what to do about methane. We're looking at leaks in oil and gas infrastructure, emissions from landfills, things we can address quickly without requiring major shifts in technology or the negative economic impacts people fear.

I was also attracted by the quality of the people involved — the scientists at EDF, Harvard and the Smithsonian Astrophysical Observatory. It's astonishing to work with such a rarefied group of people. We're making advancements all the time. It's very exciting.

What is the biggest challenge?

The biggest challenge is creating a data set on methane emissions that is affordable and believable. This is an audacious effort. Credibility is key. I brought in some of the world's very best atmospheric scientists to advise us on this. Each of them is approaching it with a healthy skepticism, which is what we want. We want people to ask tough questions. That is the first step toward broad acceptance of the measurements. And everyone is enthusiastic about participating because they want to see this work acted upon. They ask me, "Dan, is this going to happen?" And I say yes.

25% or more of today's global warming is driven by methane pollution

What lessons from JPL will you bring to this work?

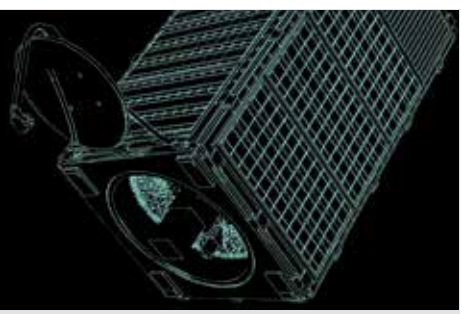
Never underestimate the challenge. Making observations from space is hard. When we started doing low-cost planetary missions 20 years ago, we had several failures. A spacecraft burned up because the English and metric units were confused and it got too close to Mars. I could hear people shouting out the numbers, 300 kilometers, 200 kilometers, 70 kilometers … we're done. The details can bite you.

Experience has taught us how to work smarter, focusing attention on critical details like, "Are the members of the team talking to each other, sharing their ideas and even their smallest doubts about the hardware?" The team's location can matter. Sometimes the person you should be talking to is in a different building and the communication isn't happening. Or, if you're adapting hardware originally designed for another instrument or spacecraft, have you done the testing to guarantee that it will work here?

Can you share any career highlights?

A highlight was seeing the Mars Reconnaissance Orbiter, which is still delivering data today about the weather and climate on Mars, enter orbit. I had been through two failures, so it wasn't a sure thing. You stare at a screen, watching this red line for a drop-off in the Doppler signal that tells you the craft has been captured by the gravity of Mars. Then you see the instruments turn on one at a time, showing they're alive and healthy. To see the experiment you conceived of 10 years earlier starting to take measurements — it's the most exciting thing you can imagine. I feel the same way about MethaneSAT. I'm looking forward to what I call "first light." That is the moment when MethaneSAT first views Earth.

MethaneSAT: Built for global climate action



MethaneSAT, scheduled to launch in 2021, is a great leap forward, not just in environmental action but also in satellite technology. No other satellite in the sky or in the works is designed to locate and measure methane emissions with such precision across so much of the planet.

Advanced sensors will pick up the sun's reflected infrared rays as they pass through the atmosphere and parse them, like a prism, to reveal methane's unique fingerprint. That raw data will be beamed back to Earth, and a series of complex algorithms will sort through the noise — factors such as clouds, tiny particles of air pollution and the reflectivity of the ground cover all need to be accounted for — to calculate small changes in methane emissions at ground level.

MethaneSAT's science team is pushing the envelope of both data analysis and sensor technology. This groundbreaking environmental innovation means that MethaneSAT will be able to spot previously unidentified sources of pollution across a 125-mile-wide swath with each pass. It also can detect low-level but widespread methane emissions, helping companies and governments reduce this pollution and verify that their efforts are working. EDF's goal: Cut methane pollution from oil and gas worldwide 45 percent by 2025.

GETTY

Flight path to a safer climate

AVIATION IS RESPONSIBLE FOR more than 850 million tons of carbon dioxide emissions annually, on a par with Germany. The international community, with EDF's help, is developing strong rules for a robust market-based program to cap net emissions.

With demand for air travel skyrocketing, carbon dioxide pollution from aviation is projected to triple by 2050, as 30,000 new jets take wing. That's enough to give any climate-conscious traveler pause. For those who fly frequently, flight emissions are likely the largest part of their carbon footprint.

The U.N.'s International Civil Aviation Organization took a big step in 2016 by agreeing to cap carbon emissions from international flights, starting in 2021. EDF played a key role, promoting the use of carbon markets to help airlines meet that cap cost-effectively. The program gives airlines flexibility to offset emissions by investing in forest conservation and other programs that achieve verified reductions.

ICAO's action marked the first time an entire global industry agreed to limit its total emissions, and it's particularly important because this pollution is not covered by the Paris climate agreement.

In March, ICAO agreed on criteria that will be used for evaluating emissions reductions. "This is positive news," says EDF International Counsel Annie Petsonk, "but the rules must establish strong transparency and prohibit double counting of emissions reductions." That is, airlines should not be allowed to take credit for reductions that a country has already claimed.

Our goal: to ensure the new market operates with integrity and, once it's established, to ratchet the cap down, in line with Paris goals. At least 100 countries are expected to participate, covering three-quarters of the expected increase in international aviation emissions.

Although the market has yet to launch, its anticipated price on carbon is already spurring airlines to reduce their emissions. The race is on to seek out new low-carbon fuels, test short-hop hybrid electric aircraft and apply insights from behavioral economics to encourage pilots to fly more efficiently.

United Airlines announced a goal to cut its greenhouse gas emissions 50 percent by 2050. The company will invest $2 billion a year in more fuel-efficient aircraft, expand its use of low-carbon biofuels and implement better ways to conserve fuel.

"We have a chance to change aviation's course," says Petsonk, "with travelers themselves playing an important role." Through social media, travelers can insist that airlines buy only certified high-quality offsets, such as from protecting tropical rainforests — and that they steer clear of deceptive offerings, such as palm oil biofuels produced by destroying those very same forests.

By capitalizing on first-mover advantages, the aviation program can inspire strong standards in other sectors, including shipping. The International Maritime Organization has agreed to a 2050 emissions target for shipping and is closely watching ICAO's progress. If successful, the aviation program will avoid at least 2.5 billion tons of carbon pollution by 2035, roughly equal to the annual greenhouse gas emissions from the U.S. power and manufacturing sectors.

Rod Griffin

ISTOCK

Airlines can offset their emissions by investing in forest conservation.

THE WILSON LEGACY

This feature honors the memory of Robert W. Wilson, a longtime EDF supporter and champion of harnessing market forces to drive environmental progress. See edf.org/wilson

ISTOCK

Chic. Desirable. Toxic.

Personal care products are full of chemicals, some of them harmful. Can manufacturers kick the dangerous chemical habit? EDF is harnessing the purchasing power of the world's biggest retailers to make sure they do.

Before going to bed, a woman in Victorian England might dab her face with opium in the hopes of awakening with fashionably pale skin. The next morning, she might coat her face with bright white paint, filled with lead. Arsenic and mercury may also have been part of her daily beauty regime.

Times have changed. But that doesn't mean our beauty and personal care products are toxic-free. Among the chemicals that color, preserve and perfume today's makeup, soaps and lotions are well-known carcinogens, endocrine disruptors and allergens.

For nearly a century, America's cosmetics industry — now worth $50 billion — has been governed by a legal framework ill-suited to an influx of new chemicals. Today, the U.S. restricts or prohibits only 11 types of chemicals in beauty and personal care products, compared to more than 1,300 regulated in Europe.

To combat these regulatory lapses, EDF is working with some of the country's biggest retailers to remove toxic chemicals from products on their shelves. With our help, Walmart has removed 23.8 million pounds of key toxic chemicals from more than 90,000 products. These include toluene, a central nervous system toxicant found in nail polish, and butylparaben, a hormone-disrupting preservative.

Preservatives are particularly concerning. They perform a critical function in beauty and personal care products by preventing the growth of bacteria, yeast and mold. But an EDF report revealed that among common preservatives are allergens and at least one carcinogen. It also uncovered a worrying lack of data on other possible hazards.

Manufacturers looking for safe alternatives to toxic preservatives are faced with a fundamental challenge: what to use instead?

EDF has established a baseline guide by which industry can judge preservative safety. And last year we advised on a year-long competition, led by the Green Chemistry and Commerce Council, to jump-start the development of new preservatives. The challenge, supported by industry giants Colgate-Palmolive and Johnson & Johnson as well as the smaller BeautyCounter, uncovered seven promising new preservatives for use in beauty and personal care products.

Among the innovators is Chinova Bioworks, a startup that produces a preservative derived from white button mushrooms. The company was founded in 2016 after two young entrepreneurs discovered that fibers extracted from mushrooms could be adapted to target specific microbial contaminants.

"Today's consumers demand greater transparency and ingredient safety," says co-founder Natasha Dhayagude. "That puts huge pressure on producers to find safe and effective preservatives." Following participation in the challenge, the company has secured $2.5 million in startup funding.

Such breakthrough products drive confidence when big companies set their own goals for safer chemicals. In recent years, the U.S.'s three largest drugstores — CVS, Target and Walgreens — and online behemoth Amazon, all followed Walmart's example and set their own safer products goals.

"Our work with Walmart created a domino effect that is transforming industry for the better," says EDF+Business manager Boma Brown-West.

And the market transformations don't stop there. Last year, a group representing 50 percent of the U.S. beauty and personal care market — including CVS, Walgreens, Sephora, Target and Walmart — published the first industry consensus on rating the sustainability of beauty products. EDF, the group's only nonprofit partner, compiled the list of toxic chemicals that the group agreed to tackle.

Consumer demand is driving these changes. "The demand is undeniable," says Brown-West. "Companies can no longer ignore it."

But it's not enough just to commit to safer products. "They need to show progress in real numbers," she adds. "And continue to invest in safer ingredient innovation."

Tasha Kosviner

ART RESOURCE

Victorian secret: toxic skin care.

Turn your backyard into a wildlife refuge

Biologists say habitat loss is the biggest threat to wildlife. You can help counter that by turning your property into a wildlife sanctuary. A common first step is putting out a bird feeder. Here are some lesser-known and equally valuable strategies:

GREENPATHHERBSCHOOL.COM

Be careful with poison!

If you have a mouse or rat problem, be very careful about applying poison. Using rodenticides carelessly can kill wildlife. One California study found rat poison in 90 percent of mountain lions and 88 percent of bobcats — and in 25 animal species altogether, including the endangered San Joaquin kit fox and northern spotted owl. For wildlife-friendly alternatives, visit saferodentcontrol.org. Consider also installing nesting boxes for barn owls. A family of barn owls can eat as many as 3,000 mice a year. For more information on these boxes, visit hungryowl.org.

Leave dead trees standing

Unless they pose a threat to people or property, dead trees can be left standing. They provide homes for more than 400 species of birds, mammals and amphibians. Woodpeckers feed on insects found in them, and many birds, including owls and flycatchers, raise their young in the cavities hammered out by the woodpeckers.

Misunderstood and maligned

Bats are unfairly vilified: They don't get tangled in people's hair, for example. But they do perform a plethora of valuable services. One Florida bat colony was calculated to capture 15 tons of mosquitoes a year. Bats are also superb pollinators — 530 species of flowering plants are pollinated by them. But bats are in serious trouble, especially in the Northeast. You can help by building or buying a bat box and making your property welcome for these fascinating and valuable creatures.

Don't confuse birds

Collisions with windows kill about 1 billion birds a year in the U.S. Sometimes the birds see reflected trees and sky in the windows and fly right at them. In the spring, they see their own reflections and think they're meeting a rival that needs to be chased off. Identify dangerous windows, especially picture windows. If you see branches or sky reflected in the glass, that's what the birds will see! Simple strategies to prevent collisions include using specially devised tape on your windows. Learn more from the American Bird Conservancy: abcbirds.org/get-involved/bird-smart-glass.

Bee inviting!

Honeybees and native American bees are in trouble. You can help. Most bees are solitary creatures, with 70 percent living underground and the remainder living in holes inside of trees or hollow stems. "Bee condos," widely available online, allow solitary bees to take up residence and pollinate your garden. Adopting a "no weedkiller" philosophy lets your yard sprout copious amounts of clover, which attracts honeybees. Native wildflowers like black-eyed Susans and phlox also bring in honeybees, as does the aptly named bee balm, a hardy, spreading perennial that Native Americans used for tea.

Bell that cat!

We like cats — honest! But cats kill more than a billion birds every year in the United States. There are a few simple things you can do. One timeless strategy: attach a bell to your cat's collar, so birds can hear it coming. That can cut predation by at least a third. Other gadgets such as brightly colored collars make cats easy for birds to spot. You can also make sure your cat is well fed or impose a cat curfew. Cats want to go outside around sunset, sunrise and after bad weather — and that's when birds feed, the most vulnerable point in their schedule. Keep your cat indoors during these high-risk times. Or better yet, keep your cat indoors all the time!

Charlie Miller

ASK AN EXPERT

ISTOCK

It's not too late!

Ned McCray of Tinley Park, Illinois, asks:
The catastrophic destruction caused by deadly wildfires in California and massive flooding in other parts of the country and other disasters should convince even the most die-hard skeptics that climate change is alive and well. We are on this planet for a short period of time. It was once pristine. Are we doomed to use our ingenuity to destroy it?

Ilissa Ocko, EDF climate scientist, responds:
When it comes to climate change, yes, we are in a tight spot. But we're hardly doomed. It seems counterintuitive, but the good news is that we know humans are responsible for the century-long global warming trend. This means that we know how to solve it. It won't be easy, but it is doable — and it's not too late. Our past emissions do not yet commit us to future warming levels above current global temperature targets (a rise of 2.7° F or greater above preindustrial levels).

The horrific impacts you describe have made climate change a top-tier issue for U.S. voters. That gives me tremendous hope, as does the newly energized debate about climate solutions on Capitol Hill. I believe Washington will soon catch up to governments, industries and organizations worldwide that are working to reduce emissions while pursuing strategies to adapt to environmental changes we've already seen.

A decade of extraordinary innovation has made the greening of the global economy not only feasible but also likely. In many U.S. states, it is already cheaper to build new renewable energy facilities than to run existing coal-fired plants.

To succeed, we ultimately need to transform society as we know it, which can be scary. But human ingenuity can do miraculous things.

IN REMEMBRANCE

Marion Rogers, who told EDF's story

T. CHARLES ERICKSON

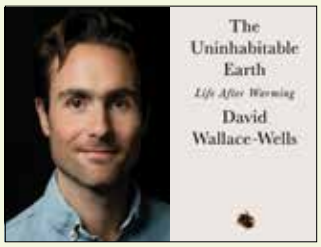
In 1969, Marion Rogers responded to an ad for an executive secretary at an organization that could only guarantee a salary for three months. "I am undaunted by either pressure or confusion," she wrote, and got hired as EDF's second employee. Rogers began working out of the cramped, noisy attic of the Stony Brook, New York, post office, when EDF had a staff of just three — a time she described as "frenetic, impoverished and fun."

Today, EDF's staff numbers nearly 700, many of whom knew Rogers as the witty, indomitable author of *Acorn Days*, the definitive story of EDF's origins. Rogers celebrated her 100th birthday before she passed away earlier this year. Thank you, Marion, for the memories!

With a gift of $25 or more, we'll send you a copy of *Acorn Days*. Just go online to edf.org/acorndays.

BOOK REVIEW

Sounding the alarm on climate



Like the map of a world you never want to visit, David Wallace-Wells' *The Uninhabitable Earth: Life After Warming* (Tim Duggan Books) offers a well-researched and highly detailed journey through the future that awaits us if we fail to rapidly reduce climate pollution.

The chapter titles alone should be enough to get our attention: *Heat Death. Hunger. Drowning. Wildfire. Dying Oceans. Unbreathable Air.* Where too many Americans have averted their eyes for too long, Wallace-Wells stares down the consequences of unchecked climate change and reminds us they don't belong to some unimaginably distant future, but to the lifetimes of our own children, if we fail to act.

Recognizing that, a large majority of Americans now see climate change for what it is: a human-made disaster unfolding before our eyes. We'll need all of their voices — and their votes — to drive the urgent debate over climate solutions that has just reignited at the national level.

"All told, the question of how bad things will get is not actually a test of the science; it is a bet on human activity," writes Wallace-Wells. "How much will we do to stall disaster, and how quickly? Those are the only questions that matter."

"The greatest threat to our planet is the belief that someone else will save it."

— Robert Swan, polar explorer