

Feeling the heat

Climate change is turning wildfires into megafires. EDF is confronting the crisis, helping make forests healthier and communities more resilient.

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Hope for a storied delta

For decades, farmers, cities and conservationists have battled over the rights to fresh water from two major California rivers, the Sacramento and the San Joaquin. The outcome: litigation, habitat loss and magnificent species nearing extinction. A solution may be at hand. EDF's recommendations for an adaptive program to improve conditions in the 720,000-acre Sacramento–San Joaquin Delta and restore habitats of salmon and other wildlife have been welcomed by water users. An agreement would signal a new era of science-based decision-making.

Resilience in the face of climate change



EDF is fully committed in the fight to reduce greenhouse gases, an absolute necessity if we are to avoid the worst effects of climate change. But even as we press ahead, climate change is already making itself felt in a variety of destructive ways: more severe storms, more damaging forest fires and more prolonged droughts. There's a growing need for society to protect itself and the natural world by building up resilience in the face of these impacts.

In this issue of *Solutions*, you'll read about a number of EDF's fast-growing efforts to bolster resilience to climate change around the country. For example, in Southwestern states that are currently in the grip of a 19-year drought, EDF, working with states and Indian tribes, helped create the historic Colorado River Drought Contingency Plan, which conserves Colorado river water that is relied upon by 40 million people (*see p. 12*).

Resilience, the capacity of natural and human systems to sustain themselves in the face of climate change and other stresses, is also driving EDF's efforts to help rebuild Puerto Rico's electric grid, which was destroyed by Hurricane Maria. On the island, EDF is developing an innovative project to demonstrate the feasibility of low-carbon microgrids (*see p. 5*). These solar powered microgrids will link to the larger grid — ensuring the delivery of clean, reliable energy — but can separate from the grid during storms to keep the lights on in remote parts of the island.

Then there is the challenge of today's wildfires, which, as we saw in 2018, are bigger, hotter and more destructive than ever before — due to decades of fire suppression, as well as historic drought and rising temperatures linked to climate change (*see p. 8*). In California alone, some 7 million homes are at risk. Responding to this threat, EDF and others are working on new forest management plans aimed at reducing the destructiveness of forest fires.

In Louisiana, EDF is helping to implement a \$50 billion, 50-year state plan to protect the coast from rising sea levels and more intense storms. Projects include sediment diversion and the restoration of marshes and barrier islands. Another key element is the construction of oyster reefs along the coast to absorb the power of storm surges and waves (*see p. 17*).

Resilience is not a cure for climate change. But while some climate impacts are already baked into the system, their full consequences remain unknown. We can make a difference — helping to save lives and protect the natural world while simultaneously working to reduce climate pollution and avoid the far worse impacts that will otherwise come.

Fred Krupp
EDF President



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.

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On the cover:

The surge in wildfires across the American West has ignited debate about climate change and forest management. *Solutions* senior writer Rod Griffin traveled

to Paradise, the site of the Camp Fire, and to other California locations where forest restoration is now underway, to report on how people are hard at work planning to better manage the fires that will surely come.

COVER: GETTY

Solutions

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FIELD NOTES



MOCAF

Shakeila James, spreading the word on clean air.

Faith, community and justice

At the National Baptist Convention, Shakeila James got an unusual request.

“You need to call me,” the woman told her. “Take my number. Put it in your bra. I don’t want you to forget.”

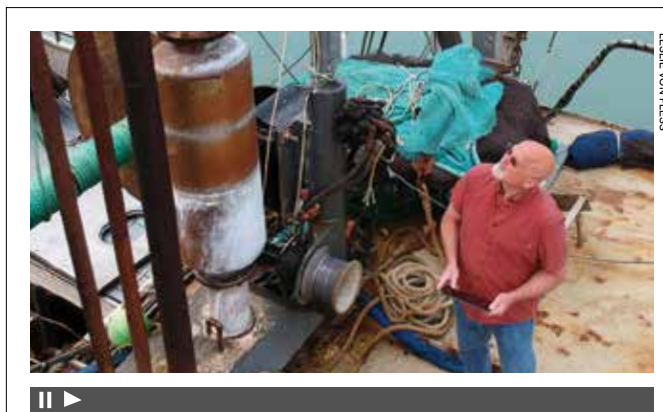
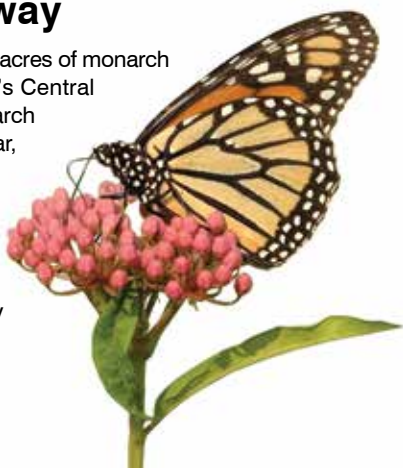
The logistics may have been unusual but the enthusiasm was not. James, from EDF-affiliate Moms Clean Air Force, had just introduced Community Rx, an initiative that brings together black women in the South to fight for environmental justice. Her message: African Americans breathe 50% more pollution from fine particles like soot and are 75% more likely to live near chemical facilities. Black children are three times more likely to be hospitalized for asthma.

“People hear these statistics and say, ‘What do I need to do?’” says James.

Community Rx helps women run at-home “table talks” on how to be an advocate and created a Bible study on caring for the earth and communities, which has been adopted by prominent black pastors. The initiative has already reached 2,000 women and inspired Nikki Katrice White, who lives in the shadow of a coal plant in South Carolina, to testify against the EPA’s proposal to weaken safeguards on power plant pollution. “Without Community Rx, I wouldn’t have been able to help activate my community,” says White. “I’m blessed to be a part of the movement!”

Migration highway

EDF is helping restore 30,000 acres of monarch butterfly habitat in California’s Central Valley. With the western monarch population down 86% last year, it’s essential to restore such migratory pathways. We also issued a field guide on habitat creation, and sponsored the first ever legislation dedicating funding to butterfly conservation in California.



LESLIE VON FLESS

Net benefits: Fishing gets a tech update

“If you don’t know how much fish you’re taking out of the water, it’s hard to manage for the future.” So speaks Oregon fisherman Brad Pettinger, star of our video exploring EDF’s transformative plan to use sensors, analytics and artificial intelligence to track catches and keep oceans healthy. See our Smart Boat Initiative out on the water at bit.ly/2VVRvQ

EDF Climate Corps on duty

What would happen if Ohio committed to an energy revolution? It could create 20,000 jobs, bring \$25 billion in investment and slash emissions. All that and more were among the findings of a 2018 EDF-supported report, *Powering Ohio*.

Now a new generation of ambitious young innovators is helping Ohio realize its clean energy potential. This summer, EDF Climate Corps fellows are working with Cleveland, Columbus and Cincinnati on projects ranging from electric vehicles to renewable energy.

They’re just three of this summer’s 123 EDF Climate Corps fellows — top tier grad students, trained by EDF who will be helping companies, cities and institutions in the U.S. and China cut energy use, create sustainable supply chains and set strict emissions reduction goals.

CODE RED

More than **2/3** of the military’s important installations are threatened by climate change.

SOURCE: U.S. DEPT. OF DEFENSE

Bad air, bad calls



Does the ump need glasses, or an air pollution mask? Researchers discovered that a 1 part per million uptick in carbon monoxide in the air made home plate umpires 11.5% more likely to make bad calls.



Rocket fuel in kids' cereal: Not a lucky charm

Perchlorate, a key component of rocket fuel, does not belong in your kids' food.

But today's parents may be unknowingly feeding their children trace amounts of this dangerous chemical, and the Food and Drug Administration is looking the other way — even though the chemical threatens permanent, irreversible harm to children. Perchlorate impairs the thyroid's ability to use iodine in the diet to make a hormone essential to brain development.

Perchlorate gets into food through degraded bleach used on food processing equipment and also through plastic packaging of dry food such as cereal and flour.

When the FDA ignored its own evidence and declined to ban uses of perchlorate that can contaminate the food supply in 2017, the agency relied on flawed science. EDF challenged the findings and requested a public hearing on the issue, but in April, the FDA denied our request.

EDF is likely to challenge the decision in court.

WHO LEADS CLEAN ENERGY JOB GROWTH?

Clean energy employs 3.25 million Americans. Last year, the 5 fastest-growing states for these jobs (except PA) had Republican governors.



Stormproof power for Puerto Rico

When Hurricane Maria hit Puerto Rico in 2017, it knocked out 80% of the island's power lines. Some residents endured nearly a year without power. EDF is working with local communities and experts in Puerto Rico to develop microgrids that can deliver clean, affordable power to rural areas, even during a storm. These small electric networks will use solar energy

and batteries to provide power whether they're connected to the central grid or not — a big asset as climate change fuels more intense storms. In addition to supporting a community-led microgrid project, EDF will advocate for legal reforms and financing to bring more microgrids online as Puerto Rico works toward its new goal of 100% renewable energy by 2050.

MEET EDF



Beia Spiller, economist

What are you working on?

I'm using satellite and health data to calculate the economic and social cost of air pollution, so we can make informed decisions on pollution limits.

Tell us about those satellites!

That's the cool part! We can measure aerosol depth and use this to calculate fine particulate pollution, the kind that causes asthma and heart disease. Being able to measure pollution levels at a 0.6-mile grid scale has transformed our understanding of the very local effects of air pollution, especially in places where air quality monitors don't exist.

What's the biggest threat to the environment?

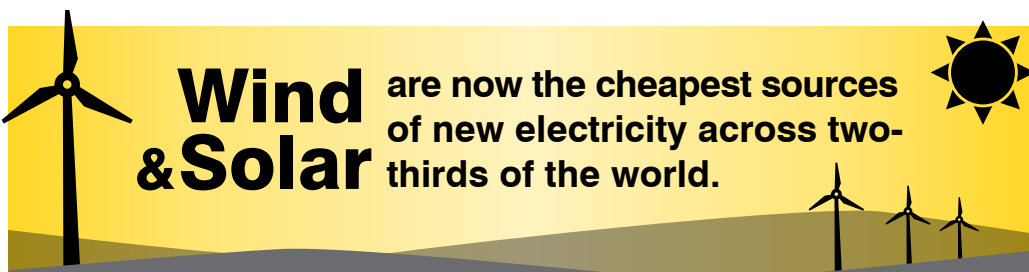
Humanity's need to generate, consume and discard with little regard for the external effects of our desires.

Can economics save us?

No — only people can. But my hope is economics can incentivize people to make the changes necessary.

Tell us something surprising.

I am intrigued by ghost towns. I love walking through the deserted streets. I feel the energy of the people who lived there, like a tingling sensation.





THOMSON REUTERS

Where polluters reign, EDF steps in

By Charlie Miller

When Houston industrial sites spew toxins, state officials keep silent. But EDF is helping local leaders use new technology to safeguard public health.

HERE WE GO AGAIN. THAT WAS Dr. Elena Craft's first thought on a quiet Sunday morning in March when she heard about a petrochemical fire 150 miles away in Houston. The fire



JULIE DERMANSKY

EDF pollution sleuth Elena Craft

had spread quickly to storage tanks containing naphtha, xylene and a chemical used to produce paint thinner. A thick plume of black smoke was spreading over the Houston suburb of Deer Park.

An EDF scientist based in Austin, Craft was immediately alarmed by the threat to public health. Her concern was heightened by the woeful record of negligence by the state agency that protects the environment, the Texas Commission on Environmental Quality. The TCEQ waited 24 hours before releasing its first statement on the fire and assured the public that all was well — even though multiple local residents were complaining about itchy throats and burning eyes.

EDF charged that neither the TCEQ nor Intercontinental Terminals Company, the company that owned the storage tanks, had released enough data to back up claims that there was no danger. The company, which has a long history of violating

clean air rules, issued a brief, misleading analysis.

“They were asking us to trust their professional judgment, and gave us zero reason to believe their conclusions were true,” says Craft.

EDF fills the data gaps

Worried city officials asked EDF to provide air quality measurements. Craft and her team placed monitors around the region to measure particulate matter and nitrogen dioxide. Some were installed at area high schools that were already working with EDF to make air quality issues part of their science curriculum. Collectively, the monitors showed elevated levels of those pollutants. Even more alarming were the high levels of benzene that were recorded. Benzene is a known human carcinogen.

It was a replay of Hurricane Harvey in 2016, when TCEQ dropped the ball in responding to millions of pounds of pollution released by oil refineries and chemical plants damaged by the storm. Following that disaster, EDF also stepped in at the city's request and found alarmingly high concentrations of benzene.

“A nonprofit shouldn’t have to scrape together money to do this,” says Craft. “But TCEQ is missing in action.”

EDF is now working to reform TCEQ. We’re pushing for more inspections, better enforcement and stronger fines for violators in this troubled region. The Houston area has a chemical fire or explosion approximately every six weeks. Thousands of air pollution events — some dangerous to human health — occur at industrial facilities in Texas every year. Only a small fraction of these events result in fines. The agency has penalized industry for less than 3% of rogue releases of harmful air pollutants since 2011.

Millions still under threat

“Texas has exported its neglectful approach to Washington,” says Craft.

A Texas state toxicologist who once claimed that cutting air pollution was dangerous for public health, Mike Honeycutt now serves as the Environmental Protection Agency’s top science adviser. Honeycutt is outside the scientific mainstream and has repeatedly downplayed the dangers posed by pollutants. He even said in testimony that the EPA has overstated the risk of arsenic and hexavalent chromium, the known carcinogen made famous by Erin Brockovich.

Millions of Americans live under the threat of air pollution — more than 40% still live in counties with unhealthy levels of smog. In some places, the problem is devastating: One in six children in Fresno, California, goes to school with an inhaler to treat asthma attacks.

But there’s hope. For the first time, new tools are allowing communities to

take control of the air they breathe. EDF is using city vehicles in Houston to test a cost-effective model for accurately mapping air pollution at a hyperlocal level.

Demanding action

Local leaders, meanwhile, are seizing on the opportunity to demand action. In Houston, retired nurse Bridgette Murray lives in Pleasantville, a predominantly African American neighborhood of 3,000 located 16 miles from Deer Park. Metal recyclers, salvage yards and an interstate push hard against the neighborhood. Trucks rumble through the area day and night. It can be difficult to breathe, and the EPA ranks Pleasantville among the nation’s worst areas for air quality. As founder of a nonprofit dedicated to environmental justice and stopping air pollution, Murray is working with EDF to map a fair, just and sustainable path forward for her community.

After a recent petrochemical fire, EDF and Houston’s health department deployed 20 air quality monitors across the city, including one in Pleasantville, because the state’s network of monitors fails to include the neighborhood, despite its closeness to a busy port, industry and heavy traffic. Murray is also working with EDF to deploy a network of monitors that will be community owned and can track pollution throughout the neighborhood. We know from previous hyperlocal mapping efforts with partners in Oakland, California, that air pollution can vary as much as eight times within one city block. “Living in a community that is so close to the chemical plants and the freeway, we are inundated by exposure,” says Murray. “EDF has always been very supportive of our work.”



HILARY PHILLIPS

MEET EDF

A warrior for clean air and water

EDF’s Mandy Warner was set on a career in law enforcement. But a class on environmental policy steered her toward environmental protection. She remembers when she learned that trees in the medians of Los Angeles’ freeways were dying from exposure to polluted air.

“If the air is doing that to trees, what is it doing to people?” she wondered.

Warner joined EDF in 2009, and one of her first jobs was supporting the Obama administration’s push for rules curbing mercury emissions from power plants. More than 75,000 newborns in the United States each year may have increased risk of learning disabilities associated with in utero exposure to mercury. Warner testified on the proposed rules before the EPA and was elated when they became final.

Eight years later, Warner is now fighting a rollback of those rules under President Trump — a rollback that threatens thousands of Americans. Children are particularly vulnerable.

The attack on the Mercury and Air Toxics Standards are part of a broad assault by the Trump administration on clean air. Also under threat are rules that protect Americans from smog and emissions of fine particles (PM2.5), defend clean cars and reduce carbon emissions.

“A dogma of hostility to clean air has prevailed,” says Warner.

EDF is deeply involved in legal battles to stop all these rollbacks. Indeed, it is one of our greatest achievements of the past two years that we have prevented many of these attacks from taking effect.

“It has taken generations to get these standards implemented,” says Warner. “Now Trump’s EPA wants to upend that progress. We are not going to let that happen.”

DANIEL JOYCE



Retired nurse turned community activist Bridgette Murray fights Houston’s big polluters.

The new era of megafires

By Rod Griffin



A warmer world is sparking bigger and hotter wildfires that devastate communities, endanger health and threaten wildlife. In a race against time, EDF is developing a forest policy focused on building resilience in communities and ecosystems.

SIX MONTHS AFTER THE CAMP Fire roared through Paradise in the Sierra foothills 90 miles north of Sacramento, the town still looks like a scene in a post-apocalyptic movie. There are signs of life — even patches of green — but the activity is mostly construction crews removing toxic debris.

“We live with the fire danger all the time here,” says Jody Jones, Paradise’s mayor, “but I never thought it would wipe the town out.” Jones lost her home in the blaze but plans to rebuild. “It’s not the buildings. I can’t bear to lose my community.”

The inferno, the deadliest in California history, killed 85 people, destroyed 14,000 homes and caused \$16 billion in damage. It all started with a spark from a high-voltage power line operated by PG&E, the state’s largest utility. Facing multiple lawsuits, the utility declared bankruptcy in January. *The Wall Street Journal* called it “the first major corporate casualty of climate change.”

It won’t be the last. “We’ve entered a new era of megafires,” says Eric Holst, EDF’s associate VP for Working Lands. Across the country, prolonged drought and heat waves have turned overgrown forests into bone-dry tinderboxes.

“Fires can be unpredictable,” Holst adds, “but there are things we can control through climate policy, better management of landscapes, building codes and community preparedness.”

Nowhere is fire risk more evident than the arid West, where tens of millions of acres are succumbing to drought and pine bark beetle infestation, providing fuel for fires. Of the 10 worst fires in California history, four have occurred since 2017 and 15 of the top 20 have been in the past two decades.

Smoking gun

Climate change is a clear culprit — or at least an accomplice. A 2016 study in *Proceedings of the National Academy of Sciences* found that climate change has doubled the number of acres burned in the West since the 1980s and that the fire

season is 78 days longer than it was.

Compounding the problem, there’s been rampant development in the wildland-urban interface, where buildings abut natural areas, posing greater fire risk to humans and making firefighting more difficult.

In addition to the human toll, high-intensity wildfires destroy wildlife habitat, degrade water quality and pollute the air. During the Camp Fire, smoke traveled for hundreds of miles, with Northern California cities recording the worst air quality in the world.

EDF has been at the forefront of California’s economywide effort to reduce greenhouse gas emissions, including the 2006 Global Warming Solutions Act, AB 32. But the surge in wildfires puts those achievements at risk. The carbon pollution from California’s wildfires in the last two years has nearly outpaced all the gains accomplished under AB 32.

RANIVY VASQUEZ/AMBI NEWS



Paradise Mayor Jody Jones in the front yard of her burned house: “We are not going to abandon our town. This is home.”

Fire suppression

There are many causes for the uptick in destructive wildfires, but U.S. forest policy is one of them. For more than a century, the Forest Service has been on a mission to stamp out wildfires. The agency’s chief spokesperson for the last 75 years has been Smokey Bear, whose stern message is: “Only YOU can prevent wildfires.”

The Smokey Bear campaign, inspired by a scared bear cub found by firefighters in the Capitan Mountains in New Mexico

4 surprising facts about wildfires



Fires are seldom “natural disasters.”

Four out of five wildfires are started by people. Increasingly, fallen power lines provide the spark. In California, five of the 10 most destructive fires since 2015 have been linked to PG&E.



It’s not just the West.

Humans cause an average of 61,000 forest fires each year, two-thirds of which are in southern and eastern states. Across the U.S., 43 million homes are near land susceptible to blazes.



A wet spring doesn’t guarantee a calmer fire season.

Paradoxically, a wet spring can actually increase fire risk by boosting the volume of vegetation available to burn later in the season.



Large-scale logging is not the answer.

Many forest experts say widespread logging, as advocated by the Trump administration, could worsen the problem because stumps provide a highly combustible fuel.



CHRIS TREMPER/FLORA

In the line of fire: a California spotted owl

during a wildfire, helped campers become more responsible, but it also reinforced the perception that all fire is bad. Many U.S. forests are not only adapted to burn periodically but depend on fire for rejuvenation and health. So does wildlife.

Today, less than 1% of wildfires are allowed to burn. As a result, forests and grasslands are overgrown. That means that when fire does come, it's more destructive. It kills more trees, torches more homes and sends far more carbon into the atmosphere, contributing to climate change.

In addition, unsustainable logging

practices removed the largest, most fire-resistant trees from many forests, leaving smaller trees and brush that serve as ladders to move fires from forest floor to canopy. Once a fire climbs to the treetops, known as a crown fire, it can move very rapidly. Some fires burn so hot they can sterilize huge swaths of land, depleting the soil of organic matter and increasing the risk of erosion, mudslides and toxic runoff.

The solution (it's not raking)

Following the Camp Fire, President Trump suggested that raking the forest floor may have helped prevent the conflagration. The solution is far more complex. Forest experts say the best hope for sustaining forests will be to thin areas with dead and declining trees and use controlled burns more frequently, restoring a more resilient forest.

"It may seem counterintuitive, but we need more fire, not less," says Holst.

In California, EDF supported legislation in 2018 that includes \$200 million for forest restoration annually for five years. "We were instrumental in creating and extending the cap-and-trade program under AB 32," says Pablo Garza, EDF's California political director. "And now a sizable chunk of the revenue is being used to pay for forest restoration." EDF is also working with the state legislature to draft a bill that will provide forestry jobs and create infrastructure and best practices for community protection.

One restoration project is in the El Dorado Forest near Lake Tahoe. During the 2014 King Fire, nearly half of the affected area burned at ultrahot temperatures, including old-growth habitat that supported 30 California spotted owls. The project involves thinning brush and creating a 600-foot-wide fuel break along an 8-mile corridor, which will help lower the intensity of future fires.

"This type of work needs to happen throughout the Sierra Nevada," says Heather Campbell, a retired 30-year veteran of the Forest Service and the chair of the local fire safety council.

The problem, of course, is bigger than California. The U.S. Forest Service estimates that between 65 and 82 million acres, from Alaska to Florida, are in need of restoration on lands within their 193-million-acre forest and grassland system. Properly managed, forests

Wade Crowfoot: On the frontlines of fire



JIM HERRI

California's Secretary for Natural Resources oversees the state's forest, water and fire policies. He has two decades of public policy and environmental leadership, including a stint as EDF's West Coast political director. Here are highlights from an interview.

How would you characterize the danger of wildfire in California — and the nation?

Wildfire has been part of the natural cycle for millennia. But land-use development in the West, combined with fire suppression and climate change, has created catastrophic fire risk. We are encountering conditions that are unprecedented in modern history.

Nearly 200 California communities face major wildfire risk. How can we protect them?

First, we need to build awareness in the 11 million people who live in high hazard areas, known as the wildland-urban interface. Second, we need to build community preparedness, including hardening structures, creating defensive space around homes and improving

absorb carbon dioxide from the atmosphere and are essential for watershed quality. Forest areas produce more than half of the nation's drinking water.

The challenge is how to pay for all this restoration. The U.S. Congress took an important step last year when it passed the Fire Funding Fix, which will allow the Forest Service to stop diverting funds away from forest management to pay for firefighting, a practice that consumes more than half of the agency's budget (compared to 16% in 1995).

"That will help," says Holst, "but more needs to be done." In California, EDF is reaching out to private landowners, who own 40% of the state's forests, to develop markets for sustainable forestry, bioenergy and wood products that use small-diameter timber. This could improve forest health and help revitalize struggling rural communities.

We're also exploring creative ways to finance forest restoration. One innovative approach, developed by Blue Forest Conservation, a startup co-founded by EDF Climate Corps alum Chad Reed, involves raising money to restore forests through a public-private partnership. To do so, it created "forest resilience bonds."

In its inaugural project, Blue Forest has enlisted stakeholders, including the Yuba Water Agency and the State of California, to agree to reimburse investors who will pay upfront costs for restoration in the Tahoe National Forest.

Building resilience

"We can't prevent wildfires, just like we can't prevent hurricanes," says Holst, "but we can lessen the damage and reduce exposure to risk."

Back in Paradise, Chris Folkman, a disaster analyst, says homeowners also have a role to play. "In the end, we have to face the fact that the climate is changing and a lot of houses are built in dangerous areas," he says. "The good news is that there are measures homeowners can take." They include installing fireproof vents, using nonflammable roofing materials and creating defensive space around structures.

Communities also need to consider changes to zoning and stronger building codes, not just for new construction but for existing structures as well. In Paradise, the houses built after 2008, when tougher standards were put in place, fared much better than those built earlier. Utilities can also put power lines underground, and communities can develop better evacuation plans.

"Paradise will rise from the ashes," says Mayor Jones, "and when it does, it will be more resilient." If done right, the new Paradise could be a model that will help other communities avoid a similar catastrophe.

ALBERT



Fighting fire with finance: Forest resilience bonds can help fund restoration projects.

understanding of evacuation routes. Third, we need to do a better job at forest management. Finally, we need to think about fire in a climate context.

What are the biggest hurdles the state faces in implementing a better fire policy?

One challenge is development in fire-prone areas, which typically falls under the authority of local governments. Many local governments are interested in growing their populations, in part to expand their tax base to provide services. It's hard to

tell poor rural communities that they can't do that. That said, the building that does occur could be done in a climate-resilient way, such as building within the footprint of the town.

What will it take to achieve the large-scale forest restoration that will be necessary?

Creating a climate-resilient forest will require a partnership among different levels of government, environmental groups and businesses. We don't want to go back to the days of the spotted owl controversy

between loggers and environmentalists. A lot has changed since then. We have to figure out how to utilize innovation and investment to manage forests to improve their ecological health, sequester carbon and protect public safety.

What role can EDF play?

EDF could play an important role in technological innovation, from monitoring where fires start to helping prevent them. EDF offers creative solutions across the board in the environmental space

and is needed here because of the scale of the problem. EDF brings credibility between communities, businesses and environmentalists.

What approaches give you hope in tackling wildfires?

Like so many environmental issues, going back to natural processes can often be the best approach. In this case, setting prescribed fires so smaller patches burn less intensely, like used to happen with lightning strikes before European settlement.



Kendra Pinto surveys the New Mexico landscape she and her people are fighting to defend.

A watershed moment for the West

By Shanti Menon and Peter Klebnikov

Saying ‘no’ to environmental destruction, Native Americans are helping Western states shift to clean energy and water conservation.

AT THE END OF THE HORSE TRAIL where she likes to hike, Kendra Pinto can look down into Chaco Canyon, site of a thousand-year-old, exquisitely engineered complex built by the stargazing Chacoan people, a place sacred to Native American Pueblos and the Navajo Nation.

“We have always been a part of this land,” says Pinto, a Navajo Nation member who grew up roaming the wide mesa near Twin Pines, New Mexico, climbing trees and harvesting wild onions. Pinto has watched as poorly regulated oil and gas well sites creep ever closer to homes, threatening health and sacred lands. And she has been speaking out, testifying before Congress about the impacts of drilling on her community.

“It’s not fair to people who breathe

that air every day,” she says.

Defending the environment is nothing new for Native Americans. But the Trump administration has repeatedly attacked tribal rights, funding for tribal programs and environmental protections that affect tribal lands and native people. This hostility is helping fuel a groundswell of action among tribal members, especially in the West. As warming Western states reevaluate how they use energy and water, tribal voices and values are helping spark a shift toward clean energy and conservation.

Stepping up for clean energy

New Mexico, one of the most intensively drilled states in the country, just sent clean energy advocate Deb Haaland, a member of the Pueblo of Laguna, to the

U.S. House of Representatives. Haaland is one of two native women who this year became the first ever to serve in Congress. At a recent House hearing co-led by Haaland in Santa Fe, Pinto, Navajo Nation and Pueblo leaders testified about the health and cultural impacts of oil and gas drilling. Haaland has also called climate change “the issue of our time.”

While oil and gas has been a source of jobs and revenue in a Navajo community with a 40% poverty rate, the industry has also taken a toll. Air pollutants from oil and gas facilities include cancer-causing benzene, smog-forming volatile organic compounds and methane, the climate pollutant responsible for at least 25% of today’s global warming. A methane hot-spot the size of Delaware — the largest of its kind in the country — hovers over the Four Corners and Navajo Nation lands, where local counties already face increasingly unhealthy levels of ozone pollution.

“If you go to the local clinic in Montezuma Creek any day, you’ll see

people being treated for dizziness, asthma and headaches,” says Sam Dee, a Navajo Nation member and oil and gas industry veteran who works with EDF to promote stronger safeguards on air quality and methane waste in the area.

Controlling leaks of methane, the primary component of natural gas, would reduce toxic air and climate pollution and recapture up to \$895,000 in royalties for the Navajo Nation, according to an analysis published by EDF, Diné CARE, Grand Canyon Trust and the Native American Voters Alliance.

The Trump administration is trying to roll back federal rules that limit methane pollution on tribal lands, but the Navajo Nation is uniquely positioned to fight back. The tribe has its own EPA, which can require companies on its land — about the size of West Virginia — to curb methane leaks. The Navajo Nation EPA is developing new air pollution control requirements that could limit methane emissions from new oil and gas developments.

“Having EDF as a resource for science, and a broader understanding of how other states and groups have approached this issue, is very helpful,” says Laurie Weahkee of the Native American Voters Alliance. “When you have better information, the community can make stronger decisions for itself. We may not be the biggest population, but we believe our voice, our culture, our being, is precious to overall creation.”

Tribes take the lead on water

More than 2,000 years ago, the ancestors of Stephen Roe Lewis settled along the fertile banks of the Gila River, a Colorado River tributary in Arizona. In a remarkable feat of engineering, they carved 500



Desert jewel: The Gila River feeds the Colorado River.

miles of canals out of the Sonoran Desert and cultivated a broad variety of crops. With equal ingenuity, they learned to survive drought.

Today, the region is in the grip of severe drought and Southwestern states are turning for help to Lewis, the Gila River Indian Community that he now heads, and a neighboring group, the Colorado River Indian Tribes.

The stakes are high. This winter, each state that uses Colorado River water was required to submit plans to reduce its water consumption to avoid a drought emergency — or else face deep cuts imposed by the Bureau of Reclamation. But squabbling Arizona water users had been holding up an agreement for years. Another Western water war seemed inevitable.

Then the two tribes stepped up.

The 12,000-member Gila River community agreed to forgo use of water for

two years in exchange for \$60 million from various sources as part of a plan to reduce cuts to powerful Arizona farmers.

The Colorado River tribes, meanwhile, agreed to keep 150,000 acre-feet of water in Lake Mead in return for \$38 million in compensation. (The city of Phoenix uses 130,000 acre-feet per year.) This helped break the logjam, paving the way for Congress to authorize the Colorado River Drought Contingency Plan.

“The tribes played a crucial role in developing the historic plan that serves as a model for building resilience to climate change across the country,” says Kevin Moran, director of EDF’s Colorado River program.

“There were some contentious moments,” admits Gov. Lewis. “But we do not see any enemies here.”

The tribes’ contribution to stabilizing the Colorado River system is all the more



U.S. Rep. Deb Haaland: “Climate change is the issue of our time.”



America’s biggest methane pollution hotspot hangs over New Mexico.

dramatic because of a painful history of farmers illegally diverting water from tribal land. After long being denied their rights, the tribes now control a major share of Colorado River water.

From the start, the two tribes steered negotiations toward conservation. “We

do not take for granted any drop of water,” says Gov. Lewis. “We’ve lived through our water being taken from us. We have seen the devastation.”

Eventually, cities such as Phoenix and Tucson agreed to give up some water. “In their willingness to conserve water, the

tribes are an example to all,” says Moran. “We want people across the region to start talking about water the way these tribes have thought about it for millennia.”

“Drought is definitely a consequence of climate change and we must do more to address it, because our future is going to be drier,” says Gov. Lewis.

EDF helped develop the tribes’ commitment and will monitor environmental compliance. We’re now talking with the tribes about restoring flows on rivers that nourish floodplains and other imperiled habitat in the parched Southwest.

“Solving our region’s water problems will take cooperation and creativity,” says Gov. Lewis. “We hope to work more closely with EDF. They were an important part of this conservation plan.”

Adds Gov. Lewis: “Being good stewards of this most sacred resource is part of who we are as a people. It’s what we have stood for across time.”

As the West confronts the reality of climate change, one thing is certain: EDF and tribal communities can be powerful allies in the urgent effort to safeguard the region.



Governor to Governor: The Gila River tribe’s Stephen Roe Lewis (left) discusses water conservation with Arizona Gov. Doug Ducey (R).

How a landmark water-saving agreement was won

Few environmental problems are thornier than Western water. Yet this spring, in rare bipartisan action to prevent a serious water crisis in the Southwest, Congress authorized a landmark plan to significantly reduce consumption from the overallocated Colorado River.

The Colorado River Drought Contingency Plan outlines how three states that rely most on the river — Arizona, California and Nevada — will share cuts in water use. It was crafted by factions more used to litigation than compromise — farmers, cities, tribes, businesses and conservationists, including EDF.

So how did such a major conservation victory happen in our divided country?

The driving force behind the agreement is a punishing, 19-year-long drought, powered by climate change, that has caused Lake Mead, the nation’s largest reservoir, to fall to its lowest level ever. Had the states not taken action, far more drastic federal cuts would have ensued.

Key to breaking the logjam were three ingredients: collaboration on a regional

scale, water trades among users, and solutions that were crafted locally.

“This is a new model for more sustainable water management required by climate change,” says Kevin Moran, director of EDF’s Colorado River program. “Going forward, the Southwest will need to implement conservation measures and economic growth strategies that align with the scarcer water reality.”

The drought plan will also provide wildlife habitat. “Both people and wildlife will be better off,” says Moran.

EDF helped broker a deal in which cities and tribes provided water to reduce the need for farmers to slash their water



Bathtub rings around Lake Mead are evidence of record-low water levels and the reality of the new drier climate in the Southwest.

use. That was critical to bringing on board powerful Central Arizona farmers.

“Now comes the hard work of implementing the plan in each state,” says Moran. “EDF will continue to partner with all stakeholders to make this a catalyst for a more resilient Southwest.”



JENNAH MOON/NYTIMES

NYC to gridlock: Drop dead

THEY CALLED IT THE SUMMER OF hell. New York City's underfunded transit system hit a crisis point in 2017, with commuter trains in disarray and 6 million subway riders facing 70,000 delays a month. One sultry June evening, a southbound F train stopped in a tunnel for 45 minutes. When it crawled into the station, windows fogged by body heat, desperate passengers clawed their way out like zombies. Above ground, vehicles in midtown averaged just 5 miles per hour — the slowest rate of any U.S. city, and barely faster than walking.

The moment was ripe for a solution, and EDF was ready with a plan. Together with a coalition of business, labor, justice and other groups, we helped New York City become the first in the United States to adopt congestion pricing, a plan that imposes a fee for driving into the clogged city center. The proceeds — expected to reach at least \$1 billion per year — will be invested in public transit. It's a bold solution that addresses the city's traffic, pollution and climate issues all at once, and it will help millions of New Yorkers breathe cleaner air. It also signals a way for other cities, such as Seattle and Los Angeles, to solve their transportation

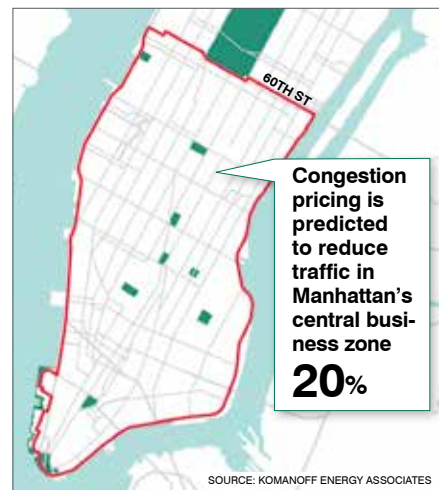
woes and meet climate goals.

By charging vehicles to enter the most crowded parts of a city — in Manhattan, the proposed zone is south of 60th Street, with round-trip peak fees likely in the range of \$12-\$14 for cars — congestion pricing reduces traffic and the problems it creates, including lost time and money, climate pollution and damage to people's lungs and quality of life.

In other cities, the method has proved its worth. Traffic delays in Stockholm dropped 30% to 50% and the number of children hospitalized with asthma fell nearly 50%. In London, congestion pricing gives 8 million residents an extra 1,888 years of life expectancy from cleaner air, according to research from King's College London.

EDF helped put congestion pricing on the map when New York City issued its first climate plan in 2007, but legislators weren't ready for it yet. "It's a fundamentally nerdy idea," admits Andy Darrell, EDF's New York regional director. "People don't normally get excited about it. But during the 'summer of hell,' all these groups saw congestion pricing as the tool they needed to fix their problem. It's like a Swiss Army knife of environmental solutions."

Details of New York's plan have yet to be finalized, such as which transit



improvements will get funded first. EDF is pushing to electrify New York City's fleet of 5,700 buses, starting with ones in communities that have the city's highest asthma rates. Electrifying the nation's largest transit bus fleet could also help bring down prices for batteries nationwide.

Seattle, Los Angeles and San Francisco are studying congestion pricing. Officials in Portland, Oregon and Philadelphia, too, are watching New York's progress.

"We're inspiring other cities to see that it's possible to have a clean and affordable ride to work," says Darrell. "This is the perfect example of people and the planet thriving together."

Shanti Menon



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

Youth respond to the #ClimateEmergency

They're informed, energized and angry. An estimated 1.4 million schoolchildren went on strike to protest climate change this spring and an even larger global strike is planned in September. The world's youth is standing up on an issue their elders have not done enough about. *Solutions* meets the young people speaking truth to power.

GROWING UP IN A LOW income neighborhood in Phoenix, Arizona, 20-year-old Angelina Luangphon (*center, left*) never thought she'd vote, let alone become an activist. "When you don't have money for food, you're not thinking about politics," the daughter of a Laotian refugee says. But after meeting with EDF-affiliate Defend Our Future, which galvanizes young voters nationwide, that changed. "Defend showed me my voice counts," she says. Luangphon, now a student at Arizona State, has called on senators to defend the EPA budget and filed comments on the proposed rollback of mercury standards. "I've seen a drastic increase in the number of people convinced climate change is happening and want to help," says Luangphon, adding wryly: "Now I need to convince my family!"

CHRIS SUGGS' TOWN OF Kinston, North Carolina is no stranger to the effects of climate change. In the past 30 years it was hit by four major hurricanes that decimated neighborhoods, destroyed lives and led to a rise in crime. "My town's socioeconomic challenges cannot be divorced from the extreme weather we've experienced," the 18-year-old (*center, right*) says. In the wake of Hurricane Florence, Suggs' teen activist group, Kinston Teens, helped with the evacuation effort. Suggs, who has partnered with Michelle Obama on improving prospects for black teens, is a familiar face in the



climate movement. In April, he spoke before the House Select Committee on Climate Change. "I've never known a world that wasn't impacted by climate change. It's time for that to change," he says.

IN MARCH, AS 1.4 MILLION children globally skipped school to protest climate change, Haven Coleman, 13, (*top*) addressed strikers at Denver Town Hall. It was a position she's familiar with. Coleman has been skipping class every Friday since January. Inspired by 16-year old Swedish climate activist Greta Thunberg, she co-founded Youth Climate Strike U.S., coordinating school strikers in 42 states. "We won't stop until we have pushed climate change up the political agenda," she says.

FOR EVELYN JUANACIO, 17, (*bottom*) environmental activism begins at home. She badgered her dad to use his car less and drew her mom's attention to plastic waste. Now her mom weaves purses from plastic bags and her dad is walking more. "He says it's because of his health, but I know it's due to my lectures," she laughs. A new study found young people's knowledge about climate increases their parents' concern about the topic. This spring, Pennsylvania resident Juanacio joined EDF on the Hill to urge her senators to reject radical EPA budget cuts. "In the end, the Senate voted to keep the funding," she says, proudly.

“We can't save the world by playing by the rules because the rules have changed.”

—Swedish school strike leader Greta Thunberg, age 16



Looking to history to fix Louisiana's land loss crisis

Coastal Louisiana land loss 1932–2016

TYLER ORTEGO REACHES OVER THE side of his boat and grabs the top of a wooden stake that protrudes just above the waterline. Lifting it high, he reveals a dark cluster of what look like small rocks, attached to the stake's muddy end.

"Oysters," he says and smiles.

Around him the shallow flats, tangled bayous and brackish marshes of the Mississippi River Delta stretch out. Home to thousands of species of plants and animals, including countless migratory songbirds, these vast wetlands are an exquisitely complex ecosystem. They're also a natural barrier protecting Louisiana's fishing industry — the country's second largest by catch size — and the city of New Orleans against hurricanes and flooding.

To an outsider, it might seem this world of quiet wetlands is unchanging. But it's not. Since 1932, coastal Louisiana has lost an area the size of Delaware to the sea. Without intervention, a further 2,000 to 4,000 square miles will erode by 2050.

"This is a human-caused crisis," says EDF scientist Natalie Snider. "The construction of levees, canals and oil and gas infrastructure have fundamentally

changed the topography of the Delta."

Climate change, including rising sea levels and more intense storms, signal even greater challenges ahead.

Working with other nonprofits and the state of Louisiana, EDF is helping implement a \$50 billion, 50-year state plan to protect the land. Projects include sediment diversion, the creation of new freshwater channels and the restoration of marshes, ridges and barrier islands.

A key component is the construction of oyster reefs.

"Oyster reefs anchor sediment and abate storm surge and wave power," Snider explains. "They help protect delicate wetlands from the full erosive force of the sea."

A coastal engineer by trade, Tyler Ortego has a plan. By planting just a few hundred bamboo stakes with starter clutches of oysters attached, he anticipates he could grow a solid reef in just 2 to 3 years. Replicating this in strategic locations along the shore would protect more than 100 miles by 2020.

"By growing reefs where the marshes are most at risk we create protective barriers, which grow and adapt as sea levels rise," he explains.

Up until the late 1800s, a vast reef of oysters fringed up to 100 miles of Louisiana coastline. That reef's demise, precipitated by the same factors that blight the coast, along with the mining of oyster shells for construction, has dealt the coastline a devastating blow.

"Oyster reef reconstruction uses nature's own power to restore the land's natural defenses and protect communities along the Delta," says Snider.

Today, reef construction projects are underway up and down the coast from Florida to New York.

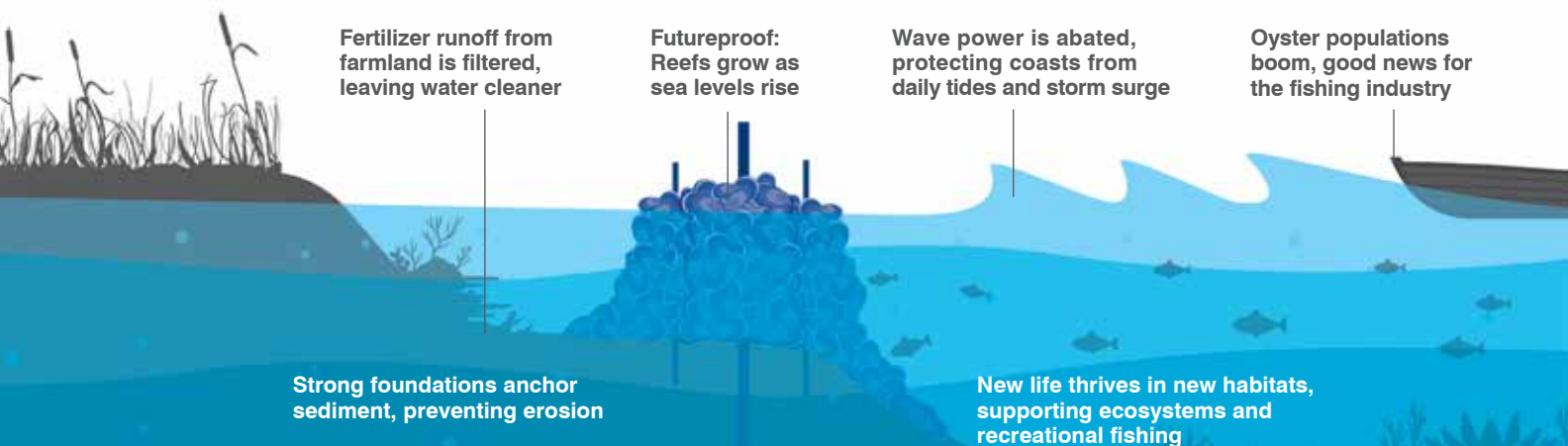
As for Ortego, his first reef will be planted in the Barataria Basin this summer. After that, he faces the challenge of scale. "This problem is too big for state money," he says. "We need to unlock private capital to help save our land."

One plan vastly reduces costs by 3D printing the concrete blocks on which the reefs thrive. Another envisions the reefs becoming part of Louisiana's thriving oyster farm economy. Solve that, and the sky, or at least the seabed, is the limit.

"Coastal engineering is my career," Ortego says. "But helping save Louisiana will be my opus."

Tasha Kosviner

The many benefits of rebuilding healthy oyster reefs



How your smartphone can green your life

We live in busy times, and living sustainably can be complicated. Fortunately, new phone apps can make the job easier. From saving water and energy to reducing the carbon footprint of your travel, these green apps help solve everyday environmental dilemmas and reduce your personal impact on the planet.

Carpool like a millennial

Waze Carpool, an offshoot of the popular navigation app, matches riders with fellow travelers. You can schedule a one-time ride-share for a trip across town, or find a regular commuting buddy for work. The app lets you review individual profiles and choose riders or drivers by star ratings or categories such as same-sex riders or co-workers only. Everyone shares the cost of the ride and the benefits of reducing pollution from the trip. According to Waze, the app can reduce commuting costs by \$600 a month for a 30-mile trip. Waze Carpool also integrates with other carpool management apps, including RideAmigos and Luum.

*Available on iTunes/
Google Play*

Find a bike route

Whether you're planning to run an errand in town or traveling through Scotland, Bike-map provides an incentive to forego more polluting forms of transportation by plotting out a bike-friendly route. Input your starting point and destination and the app will show you the best bike route, including distance, travel time and elevation information. You can also explore rides shared by other users, complete with stopping points for refreshments, bike services or sightseeing. The app, updated constantly, boasts 4 million routes worldwide and counting.

*Available on iTunes/
Google Play*

Stay on top of your energy costs

How much is that big TV in the bedroom or that extra fridge costing you? Using information you input from the EnergyGuide label and your local utility rates, the Energy Cost Calculator app figures the hourly, daily or monthly cost of powering individual appliances and calculates their carbon emissions. It will let you know exactly how much money (and climate pollution) is going out the door to keep a few cans of beer cold in the garage refrigerator.

*Available on iTunes/
Google Play*

Track and reduce your water use

Every drop counts, and this useful app counts every drop. Dropcountr connects your tap to participating water utilities to help you manage and reduce your water use. The app shows you how much water you use each month, helps set reduction goals and find utility rebates and lower rates. What's more, it sends you an alert if you have a leaky tap or toilet. Users report cutting monthly water use by an average of 9%. You can also compare your water use with your neighbors' for a little friendly competition.

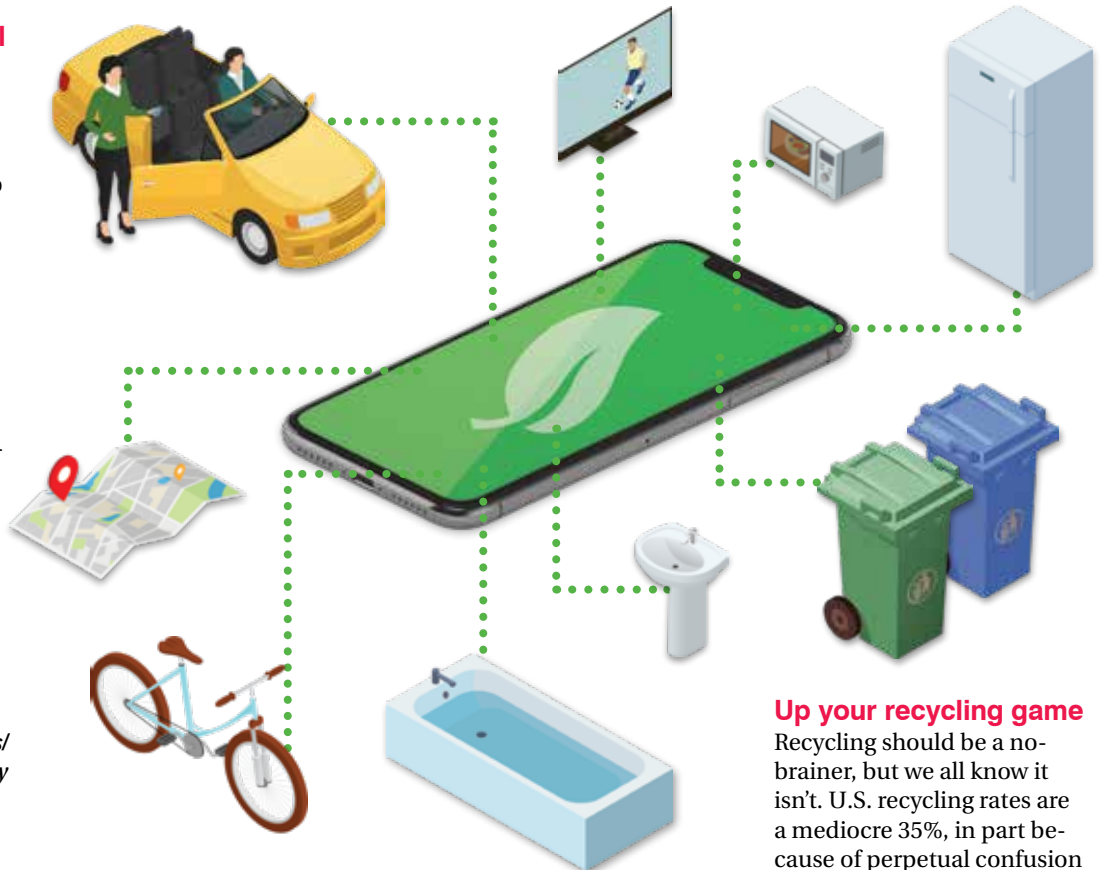
*Available on iTunes/
Google Play*

Up your recycling game

Recycling should be a no-brainer, but we all know it isn't. U.S. recycling rates are a mediocre 35%, in part because of perpetual confusion over what to recycle and how. Recycle Coach has teamed up with more than 3,000 cities to make recycling easier. Their motto: "We worry about your garbage and recycling so you don't have to." The app helps you set up a calendar with reminders so you don't miss your pickup day or special events like electronics collection. You can find city-specific information on recycling and disposal of thousands of items to ensure you're putting your waste in the right place. (To reduce your recycling load, see myplasticfreelife.com.)

*Available on iTunes/
Google Play*

Jim Motavalli



ASK AN EXPERT

Lies, damned lies and the internet

Melanie Eldredge, of Salt Lake City, asks:

Donald Trump recently claimed that noise from wind turbines causes cancer. In this era of fake news and misinformation about climate change, what can EDF members do to ensure the truth prevails?

Eric Pooley, EDF senior VP for strategy and communications responds:

Thanks for asking; this is just so important — and everyone really can play a role.

The first thing we can all do is to make sure we're not contributing to the problem. I think most of us have probably shared something on social media that turned out to be false. The key is to verify before you share. If it's a news item, consider the source — if it didn't come from a place you know and trust, do a quick Google search. If it's a video, be extra careful, because it

could be edited or digitally manipulated to "show" something that simply didn't happen. These days, we literally cannot believe our eyes.

Next, learn the difference between misinformation, disinformation and malinformation. Misinformation is simply false, sometimes by mistake. Disinformation is false on purpose — intended to deceive and do harm. And malinformation includes materials that may be partially true (leaked emails, for example) but are spread with the intent to damage reputations and sway public opinion.

According to the watchdog organization First Draft News, all three categories are deployed by bad actors who use social media and other digital channels to spread lies, doubt and confusion on environmental and other issues. At first, it may be hard to tell which category any given piece of fake news falls into. But the key to digital lit-



GETTY

eracy is understanding that the wild, outrageous, super-sharable story that just popped up in your feed likely didn't get there by accident. Someone with an ugly agenda — maybe even the president — put it there.

As digital strategist Melissa Ryan has written, "Trolls look

to sow division. They win by dividing us against one another." Presenting a united front by refusing to spread fake news is our best defense.

"Solidarity with one another," says Ryan, "makes it more difficult for the attacks to succeed."

EDF ONLINE

Experience a magnificent migration

Ever wondered what it would be like to be a butterfly? Thanks to a new virtual reality experience, you can now join monarch butterflies on their majestic 3,000-mile migration north for the summer.



ISTOCK

With 180 degree technology, you'll find yourself in the remote forests of central Mexico, surrounded by millions of monarchs resting for the winter. As spring arrives, you'll join the monarchs' journey across the plains, pausing in milkweed-rich breeding habitats of Texas and Iowa.

Guided by EDF expert Eric Holst, this beautifully shot film describes the many challenges the butterfly faces — from habitat loss to climate change — and introduces you to the farming and ranching heroes at the heart of EDF's efforts to save the beloved creature from extinction.

How do I view the video?

Simply type [edf.org/monarchVR](https://www.edf.org/monarchVR) into any browser. Feeling high tech? Use your phone to scan the QR code to the right.

In regular 2D, you can drag around the screen to see more. For the full VR experience, purchase a VR viewer such as the Google Cardboard (\$10 online).



“Tell me, what is it you plan to do with your one wild and precious life?”

— Mary Oliver, poet, 1935–2019

