Solutions

EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

Vol. 53, No. 2 / Spring 2022

Feeding a hungry world

Our oceans face increasing threats. EDF is helping fishers fight climate change and preserve vital food supplies for billions.

Gardens of the Queen

Cuba's Jardines de la Reina National Park is one of the world's most spectacular marine ecosystems. Home to vibrant mangrove forests and some of the best-preserved coral reefs in the Caribbean, the Gardens recently won a prestigious Blue Park award, recognizing it as one of the 21 best protected marine parks in the world. The conservation success of Jardines de la Reina is built on science-based management and monitoring projects that EDF helped develop.

GETTY

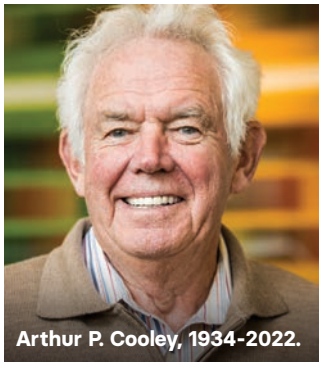
Art Cooley: The torch he lit

This winter, Art Cooley — one of EDF's founders and a board member for more than 50 years — passed away.

It was in Art's Long Island living room that EDF was born. That's where a small group of scientists first met with the attorney who would join them in bringing a case against the use of DDT, which threatened the survival of America's great birds of prey. Soon after, in 1967, the group founded EDF.

To meet Art was to be struck by his genuineness, enthusiasm and warmth. He called himself "an eclectic optimist," and as someone once remarked to his fellow founder Charlie Wurster, Art "could get a group of people excited about a blade of grass".

He was also a scientist, an educator (he was a revered high school science teacher) and a powerful advocate. People listened to him.



Arthur P. Cooley, 1934-2022.

From the first, Art fostered an active, forward-looking vision of environmentalism — and of EDF. "He was the leader with a vision for the future, always looking to where this organization could build," said Jim Tripp, a pioneering EDF attorney for 46 years.

To be effective, Art understood, we had to constantly adapt as science advanced and new challenges arose.

Increasingly, those challenges are multinational in scope and EDF has evolved to meet them. Climate change, with its potentially catastrophic impacts, is now central to all our work. It requires global solutions and has put people — especially those most burdened by pollution — at the core of our efforts. (For more on EDF's evolution and vision for the future, see edf.org/Vision2030.)

Our focus on global climate and people permeates this issue's cover story, which highlights EDF's efforts to preserve the world's fisheries. They are increasingly threatened by warming seas and many other challenges. By ensuring their continued abundance, we can tackle food insecurity and secure the lives and livelihoods of hundreds of millions of people around the world *(see p. 8)*.

Over the decades, Art supported EDF's ongoing evolution with pride and joy. As he said on the occasion of our 50th anniversary in 2017: "It has been one of my life's greatest satisfactions to watch EDF grow and solve even bigger and more challenging problems."

For all of us who carry the EDF torch that Art and his co-founders lit in his Long Island living room, Art's optimism, generosity of spirit and ability to bring people together will continue to light the way as we pursue our vision of a vital Earth for everyone. Art Cooley was 87.

Fred Krupp
EDF President

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On the cover: Photo illustration by Tink Tank Studio.

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Solutions

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EDF'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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EDF ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

FIELD NOTES

Colorado gets even tougher on methane emissions

Colorado continues to lead the way on climate by adopting the nation's strongest rules to cut methane pollution from oil and gas operations. The rules will cut emissions in half by 2030. Methane is responsible for roughly 30% of global warming.

EDF, with frontline communities, as well as environmental justice and public health groups, organized support for the rules, which were approved by the state's Air Quality Commission and build on our years of work in the state. In 2014, we helped Colorado adopt the world's first regulations limiting oil and gas methane emissions.

The new rules require frequent inspection of all wells, including some 12,000 leak-prone sites that are responsible for an outsized share of emissions. The state's actions also set an important precedent for the Environmental Protection Agency, which is expected to announce tighter federal methane emissions standards soon.

"Colorado again sets the bar for methane protection, and we applaud the Air Quality Commission for adopting measures that will also provide greater protections for those communities most affected by oil and gas pollution, including those living near well sites," says EDF's Matthew Garrington, who works on oil and gas industry regulation from EDF's office in Boulder, Colorado.

More needs to be done. Even as these new rules take effect, Colorado has made insufficient progress on achieving its economy-wide climate targets. Our office is pushing the commission to put in place additional regulations to reduce greenhouse gas emissions from all major sources, as mandated by state law.

Surprise comeback possible for cleared forests

ALAMY.COM

The world's tropical forests sequester vast amounts of carbon and are key to the fight against climate change. These forests are rapidly disappearing, and while it is critical to preserve those that remain, a major new study provides hope that some tropical forest lands that were cleared and then abandoned can renew themselves. These so-called secondary forests, the study found, can regenerate their plant species diversity in 25 to 60 years, though it may take a century or more to recover the full biomass of a mature forest. This suggests conserving degraded forests and encouraging large-scale regeneration of cleared lands in tropical countries could be an important natural climate solution.

Source: Science.org

130 million

The number of electric vehicles projected to be on the road throughout Europe by the year 2035, up from fewer than 5 million EVs today.

ISTOCK

Source: Ernst & Young/Eurelectric

500 thousand

The annual climate impact of methane leaking from U.S. cookstoves in the U.S. equals the CO_2 emissions from half a million gas-powered cars.

UNSPLASH

Source: Environmental Science & Technology


GETTY

$145 billion

Cost of U.S. climate-related weather disasters in 2021.
Source: NOAA

$270 billion

Estimated savings from declining U.S. vehicle emissions from 2008 to 2017.
Source: PNAS

MEET EDF

Eric Kills A Hundred

EDF's tribal program manager

What do you do?

I work with tribes and tribal groups and in particular the Navajo Nation as they create a program to monitor and control air pollution from oil and gas operations on their territory, which covers parts of Arizona, New Mexico and Utah. The program will also be a source of revenue for the tribe.

Why is this important?

For many years, the oil and gas industry has steamrolled over Indian country. Tribes should have a voice in how it is regulated.

Who is your role model?

My great-great-great-grandfather Red Dog helped negotiate a treaty with the U.S. — later broken — that gave tribes exclusive settlement rights to territory in South Dakota, including the sacred Black Hills. He was thinking seven generations ahead, trying to guarantee that we could continue our way of life. I hope to pick up where he left off.

How did your family come by its name?

It was given to my great-great-grandfather, Red Dog's son, after an 1866 battle called Fetterman's Massacre, or the Battle of a Hundred-in-Hands. He would have been too young to fight, so I like to think the name refers to a work ethic. But I get stopped at the airport all the time.

EDF to EPA: Get BPA out of our food

EDF, leading a coalition of physicians, scientists and public health and environmental organizations, has petitioned the Food and Drug Administration to revoke its approvals of bisphenol A in adhesives and as a coating for metal cans containing food. The petition also calls for limits on the amount of the chemical that can leach from rigid plastics, such as those used in takeout meals.

Even small amounts of BPA can disrupt people's immune, reproductive and endocrine systems. This fact has spurred the European Food Safety Authority to propose strict new limits that will effectively ban the chemical in any products that come into contact with food.

"Americans' exposure to BPA is more than 5,000 times what European experts have determined is safe to prevent immune-system harm," says Tom Neltner, EDF's senior director for safer chemicals. Given the extraordinary risks to Americans' health, the petition calls on the FDA to undertake an expedited review of the requested actions to improve food safety.

GETTY

IN THE COURTS

Making the case for clean air at the Supreme Court

EDF and our allies are opposing claims by the coal industry and their state allies urging the Supreme Court to radically curtail EPA's authority to regulate climate pollution from power plants under the Clean Air Act. The case, *West Virginia v. EPA*, asks the Supreme Court to overturn a lower court ruling striking down Trump-era actions gutting the Obama-era Clean Power Plan. The case could prevent EPA from using effective and efficient solutions to cut carbon pollution from power plants and, more broadly, severely limit the ability of all federal agencies to adopt health and safety protections.

"There's an enormous amount at stake for the American people," says EDF general counsel, Vickie Patton. "If they are successful, there will be far-reaching damage to all sorts of ways we protect human life: by regulating food safety, car safety and deadly pollution."

A decision is expected this summer.

Fighting an unjust pipeline

A historically Black farming community is battling a gas pipeline that threatens its 160-year legacy of environmental stewardship.

By Shanti Menon

Most people would have driven right by the little flyer, stuck to the post of a stop sign across from a corn field. Not Dr. Jifunza Wright-Carter. She pulled over and got out to read the tiny print: "Learn more about the Proposed Hopkins Park/Pembroke Township Expansion Project."

Vaguely worded as it was, Wright-Carter knew exactly what the flyer was about — a proposal from Nicor Gas to build a pipeline through her community. Wright-Carter, a family physician and community health advocate, tried to attend the online meeting referenced on the flyer. Unlike most people in Pembroke Township, a community of about 2,000 people located 70 miles south of Chicago, she had broadband access. But she never got past the virtual waiting room.

Ten other community members who did attend got little for their trouble. In recordings, the meeting facilitator is heard repeatedly telling commenters that "regulations" prohibited company officials from answering their questions.

One week later, Nicor Gas filed for approval to proceed with the pipeline, claiming that public comment did not warrant any changes to its plans.

Building clean energy equity

Pembroke residents are fighting an all-too-familiar battle: the right for low-income communities and communities of color to have a say in environmental decisions, which are often made in spaces where their voices are not represented, from federal agencies to local zoning boards.

Their struggle also highlights a looming climate injustice. Public utilities pass the cost of building and maintaining infrastructure, such as pipelines, on to customers through their bills. As more buildings go electric, gas utilities will serve a smaller customer base.

"Wealthier people can afford to upgrade to cleaner technologies," says EDF attorney Christie Hicks. "That will leave fewer, mostly lower-income customers, to foot the bill of the existing system." To compensate, some utilities, like Nicor, which serves 2.2 million customers in Illinois, are trying to lock in new revenue by expanding natural gas service. This also locks in decades of climate pollution at a time when Illinois and the nation are moving to reduce it. Natural gas use in buildings is already responsible for 12% of U.S. climate pollution. In addition, the expansion will burden Nicor's customers with rising costs for decades.

Environmental champions: Dr. Jifunza Wright-Carter and Fred Carter.

CHICAGO HISTORY MUSEUM

EDF is fighting alongside the Pembroke Environmental Justice Coalition, co-founded by Wright-Carter, together with Blacks In Green and the Green Power Alliance, to stop the Nicor pipeline. And we're working with states and utilities on reforms that will protect low-income communities as utilities move to clean energy.

Rich history and ecology at risk

Black people have been farming in Pembroke since the 1860s, and for decades, they supplied food to neighborhoods in Chicago and beyond. Fred Carter, Wright-Carter's husband, remembers running to greet the melon man from Pembroke, who sold fruit from a horse-drawn cart on Chicago's West Side.

Today, just a handful of Pembroke residents are farmers. They work the land as Pembroke farmers always have — maintaining healthy soil by rotating crops and using few or no chemicals. As a result of generations of this care, Pembroke is home to one of the last remnants of an endangered ecosystem known as black oak savanna. Fireflies still light up the night in the summertime. There are tree frogs in the woods.

Pembroke is also one of the lowest-income communities in Illinois. The median household income is a little under $30,000. According to Wright-Carter, "Drugs and joblessness are a problem." Many people don't have televisions, let alone internet. The township has never had natural gas service. People rely on propane tanks or wood-burning stoves for heat and cooking.

A place worth protecting: Pembroke Township, Illinois, was founded by formerly enslaved Africans in the 1860s.

BLACKFOODJUSTICE.ORG

A *Chicago Tribune* editorial in 2019 lauded the pipeline effort, calling it a "goodwill gesture" that would "remove a barrier to jobs" in a community suffering from "chronic neglect". The Reverend Jesse Jackson endorsed the project, as have state and local elected officials.

A poor tradeoff

But Wright-Carter and the PEJC roundly disagree. Construction of the 35-plus miles of pipeline, they say, would disturb Pembroke's carefully tended soils, threaten water supplies and put its unique ecosystem at risk. They'd prefer to explore renewable energy options instead.

"Generations of Black environmental stewardship should not be thrown out the window," says Wright-Carter. Residents are also concerned about the risk of leaks and explosions. Fires in Pembroke — there have been several in recent years — spread quickly due to high winds and flat, open terrain.

Nicor's safety record offers little reassurance. The company is currently under investigation by the Illinois Attorney General's office for persistent gas leaks at another facility. In 2019, it was issued a violation for dumping wastewater laced with benzene on farm fields that lay above a drinking water aquifer.

The proposed Pembroke pipeline would cut through the 52-square-mile township in order to provide gas access to a small group of residents in one section, the 4-square-mile Village of Hopkins Park. EDF investigations revealed that Nicor worked closely with Hopkins Park and state elected officials for years on the expansion without informing local residents. Since late 2020, Nicor contributed $4,500 to the campaign funds of two state senators, Patrick Joyce and Mattie Hunter, both of whom sponsored Nicor-backed legislation to authorize the pipeline.

Johari Cole-Kweli continues Pembroke's sustainable farming legacy.

CHICAGO HISTORY MUSEUM

Despite Nicor's professed desire to serve Pembroke's low-income population, the company never assessed whether these potential new customers could actually afford to use the gas, says Hicks. Many homes are set back more than 500 feet from the road, making gas line connections prohibitively expensive.

Converting homes and appliances to use gas also costs money. Even if they wanted it, many Pembroke residents wouldn't be able to afford gas. But this doesn't make a difference to Nicor's bottom line, thanks to legislation the company helped craft and push through the state legislature in 2021, which authorized the expansion to proceed, paid for by its existing customers.

"Nicor will profit from this project, regardless of whether a single person in Pembroke uses this gas," says Hicks.

Seeking a renewable future

And then there's the question of climate. As a low-income community, Pembroke would qualify for several clean energy programs under Illinois' new climate law.

"We do not want to be prisoners to fossil fuels while others across the state enjoy cleaner alternatives," says Wright-Carter, who would like to see if community-owned solar farms could provide clean energy as well as an economic boost for resident landowners.

Stopping the pipeline will be an uphill battle. The project has already been authorized by state legislators and approved by Illinois utility regulators. EDF is supporting the PEJC in appealing that approval in court and advocating in the state legislature to roll back the law that cleared the way for the project to move forward. For Wright-Carter, the stakes are high.

"If we don't protect and restore the legacy of farming and stewardship in this community, all the history, the richness of this place will fade away. And then what's left for our children?" ■

Fishing for a future

Climate change and overfishing threaten artisanal fisheries — and the billions who depend on them for food. But there's still time to turn the tide.

By Tom Clynes

Eduardo Tume, who passed away from COVID-19 in 2021, was a passionate advocate for sustainable fisheries on Peru's northern coast.

H. PLENGE/EDF

SIX DAYS A WEEK, HOURS BEFORE the first rays of sun brighten the pale cliffs above Cabo Blanco, Carlos Chapilliquén rows through the surf to his small wooden boat and raises its sail. With a tug on the mainsheet and a flick of the tiller, he coaxes the wind into the cloth and the boat surges over the waves, into the heart of one of the most abundant marine ecosystems on Earth.

From the age of six, when his uncles taught him how to bait a hook and troll with the wind, Chapilliquén has worked the Pacific waters off his hometown in northern Peru, where the cold Humboldt Current sideswipes the warm equatorial current. The resulting upwelling of nutrient-rich water has long sustained a chain of rich marine life, from plankton and anchovies to mackerel, shark and tuna. It was in these waters in 1953 that a Texas oilman landed a 1,560-pounder that still stands as the biggest marlin ever caught.

"Nowadays, it's rare to see a fish that's even a third of that size," says Chapilliquén, 44, who has watched the horizon change dramatically over his lifetime as oil rigs multiplied offshore. Spills — such as a 11,900-barrel release near Lima in mid-January that devastated wildlife and left hundreds of fishermen out of work — are just one of "a mountain of challenges" that Chapilliquén says the area's small-scale fishers face. Catches continue to decline as climate change advances. And large, industrial fishing boats from elsewhere — some fishing illegally — crisscross the nearshore waters, decimating stocks and jeopardizing local livelihoods.

"We play by the rules because we want to preserve the resource for future generations," says Chapilliquén, a father of three who leads Cabo Blanco's artisanal fishing guild. "But these giant ships come in and drop their nets to the bottom, killing everything in their path. We don't have a chance."

FLICKR/THE WORLD FISH CENTER

Big sails and small carbon footprints: Artisanal fishing in Cabo Blanco, Peru.

H. PLENGE/EDF

The fishers of northern Peru are not alone. As the United Nations names 2022 the International Year of Artisanal Fisheries and Aquaculture — in recognition of the contributions of small-scale fishers, fish workers and aquaculturists to their communities and nations — many of the estimated 820 million people who depend on marine foods for their livelihoods are seeing catches and incomes plummet. A combination of destructive harvesting, pollution, climate change and coastal development is degrading already stressed ocean ecosystems and reducing fishery yields. For the past three decades, the human demand for wild fish has far outpaced what the world's waters can reproduce. Today, more than one-third of fish stocks are below biologically sustainable levels.

The tropics have been hit especially hard, as waters overheated by climate change cause prized species to migrate poleward to the cooler waters they prefer. The smaller, nutrient-rich fish that remain are increasingly scooped up by high-volume fishing operations to sell in faraway countries. Without drastic action, many tropical developing nations could see catches fall another 40% by the 2050s.

By then, the planet's population is projected to have grown by more than 25%, making declining catches a food-security concern as well as an economic and environmental one. More than 3 billion people rely on seafood as a vital source of protein in their diets, and billions more depend on it for essential nutrients such as omega-3 fatty acids, calcium and iron.

"It spells a looming food crisis in the equatorial band where people are already at the threshold for inadequate nutrition and fisheries are most at risk from illegal fishing, weak governance and climate impacts," says Christopher Golden, a Harvard professor who studies nutrition and environmental health.

Peruvian fisher Carlos Chapilliquén.

FUNDACIÓN ALBATROS MEDIA

Blue foods to the rescue

Despite the dire outlook, many experts believe that foods captured or cultivated from the ocean or other waterways — sometimes called blue foods — could be the most promising way to sustainably feed growing populations while adapting to, and even slowing, climate change.

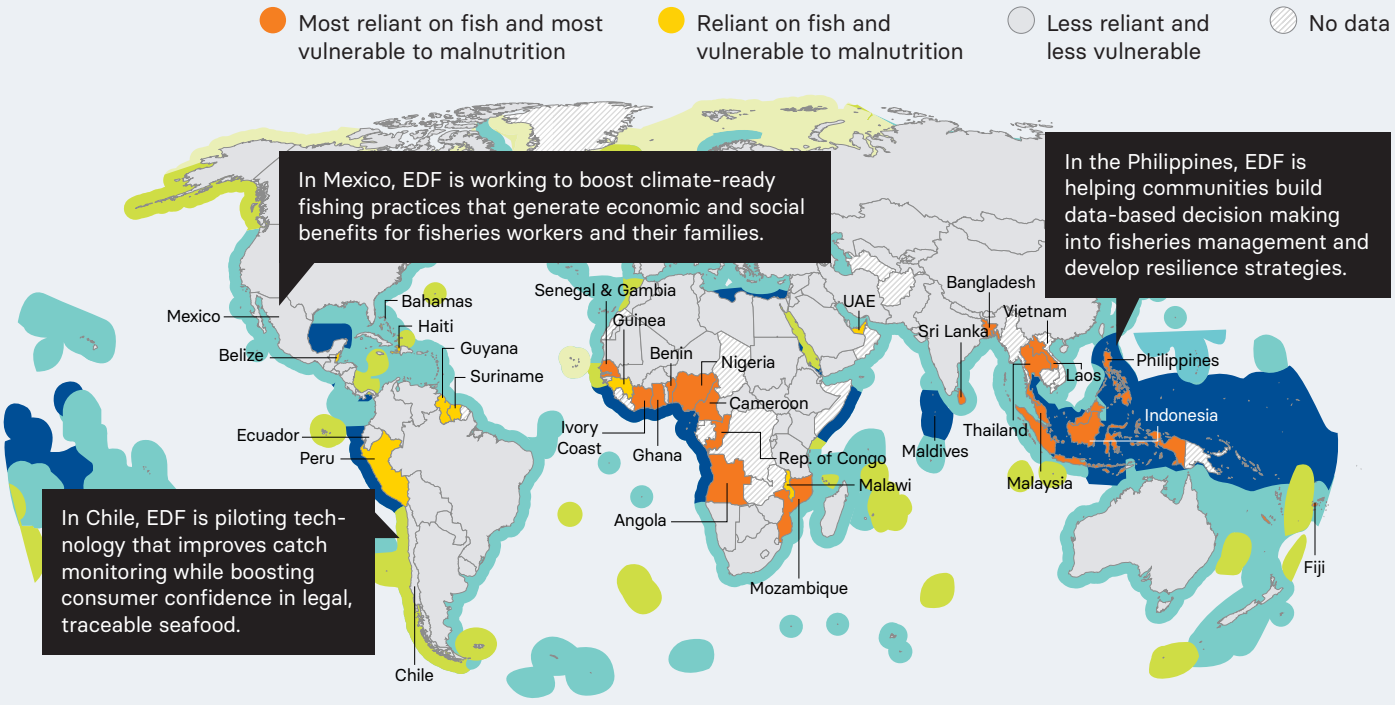
EDF and partners around the world are working to elevate seafood's role in addressing food insecurity, particularly in tropical developing nations, and to open new opportunities for sustainable and resilient marine ecosystems and the communities that depend on them.

To be successful, the work requires governments, regulators and policy-makers to make a fundamental shift from treating fish not just as a commodity, but as essential food.

In Peru and many other developing countries, cash-starved governments either underestimate the value of their

Troubled Waters

In tropical developing nations, where people are most dependent on wild-caught fish, fisheries are at greatest risk from illegal fishing, climate change and lack of data to guide management. EDF is helping fishers and regulators conserve and rebuild stocks.



Source: Nature, June 2016

FLICKR/THE WORLD FISH CENTER

In Bangladesh local fish are an increasingly expensive staple.

fisheries or sell the rights to harvest relatively "low value" fish to foreign entities, which profit by meeting the exploding global demand for fish oil and fish meal used to feed farmed fish and other animals in North America, Europe and Asia.

Peruvian anchovy, for instance, is rich in iron and protein and has some of the highest concentrations of certain fatty acids of any fish species. But when it's sold overseas these nutrients are unavailable to the 21% of Peruvian women who suffer from anemia. In West Africa, where one-third of children under five years of age are stunted due to malnutrition, the local catch could meet the nutritional needs of people living near the ocean — and yet the global demand for fish meal has pushed the price of locally caught fish beyond the reach of many families.

"There's nutritional gold in these countries' waters, but they're selling it as if it were fill dirt," says Tom Grasso, who leads EDF's work on climate-resilient food systems. The key to capturing that value, says Grasso, is for countries to align fisheries policies with nutrition and finance policies.

To establish the need for this shift, Harvard's Golden and his collaborators created the most comprehensive nutritional database of seafood ever assembled, identifying more than 3,700 edible aquatic plants and animals ranging from seaweed to sharks, and analyzing the nutritional composition of each.

"We found some real surprises," says Golden. For example, the team showcased several categories of small fish and shellfish with a far higher nutritional value than any type of cultivated terrestrial food including beef, and with a much lower carbon footprint. Farm-grown oysters, for example, have less than 0.5% of the greenhouse-gas cost of beef per kilogram of protein.

An analysis of the data found that increases in the production of blue foods generate shifts in consumption patterns that benefit nutritionally vulnerable populations, including pregnant and lactating women and children under five years old, according to an article authored by EDF scientist Kristin Kleisner.

Empowered communities

All around the Pacific Rim, from Peru, Mexico and Chile to Indonesia and the Philippines, EDF and partners are working to build awareness of fisheries as critical food systems and encourage supportive government policies. In Cabo

Blanco, Peru, EDF partner H2Oceanos helped the fishing community get recognized as a National Cultural Heritage site and is now supporting its efforts to secure full tenure rights to its traditional fishing grounds. EDF also facilitates communications between traditional fishing communities across the world to share information and strategies for management and advocacy. One successful approach has been to put the ability to measure fish catches into the hands of fishers themselves.

"When fishers back up their observations with data, they can influence the regulators to help set sustainable limits on catches," says Chris Cusack (*pictured, right, in hat*) who leads EDF's oceans technology initiatives. In the economically important blue swimming crab fishery in the Lampung province of Indonesia, Cusack's team distributed a smartphone app that allows fishers to report the size of their catch to local monitors, who then compile the data for managers to use when setting policy.

Fishing communities in Chile are now also using the app to monitor the stocks of sierra, a staple fish that's cooked daily in many households up and down the Chilean coast.

Other emerging technologies such as on-board video cameras and GPS trackers hold the promise of better information and decision-making.

> **"There's nutritional gold in these countries' waters, but they're selling it as if it were fill dirt."**
>
> **— Tom Grasso, EDF Vice President for Climate Resilient Food Systems**

To get a broader picture and support data-informed policymaking, EDF recently created SAPO (Sistema de Alerta, Predicción y Observación), the Humboldt Current's first early warning system for climate impacts on fisheries. Onshore and on the high seas, vast amounts of data are collected each day from hundreds of instruments in Chile, Ecuador and Peru. The project paves the way for more cohesive and collaborative fishery management across the three countries.

"Our goal is to put this climate science into the hands of governments, coastal communities and artisanal fishers so they can take climate-smart actions," says Erica Cunningham, who leads EDF Oceans' work in Latin America.

MUHAMMAD FADLI

Blue swimming crab fishers in Indonesia use technology to manage their fisheries.

Sustainable aquaculture

Many environmentalists believe that sustainably farmed fish could help meet a growing population's demand for protein.

"With capture fisheries so close to their limits there's broad recognition that most of the growth in seafood production will need to come from well-managed aquaculture." says Jim Leape, co-director of the Stanford Center for Ocean Solutions. "The problem is that aquaculture relies too much on wild fish for feed."

That's a big problem, with about 25% of the world's wild-caught fish now being converted to meal for farmed fish and other animals. Researchers are exploring alternative food sources, but farming species that are lower in the food chain may be the most effective way to reduce dependence on wild-caught fish meal.

Conservationists say industrial fish farms also need improved oversight, better waste management and new technologies for recirculating water. But when properly planned and managed, aquaculture can make an essential contribution to local diets and economies. In Bangladesh, for example, researchers found that increased farming of small, nutrient-rich, indigenous fish in household ponds would provide substantial health benefits by preventing diseases caused by vitamin A deficiency.

Whether the subject is farmed or wild-caught seafood, there's a palpable urgency to the conversation about the role of blue foods in sustainably feeding people and fighting climate impacts — a conversation that fishers such as Carlos Chapilliquén say is essential and long overdue.

"God gave us this beautiful sea and filled it with life," Chapilliquén says. "Now it's up to us to defend it." ■

Harnessing markets for good

They're the world's best hope for slashing climate pollution on a global scale. But they're fiendishly complex. We break it down.

What is a carbon market?

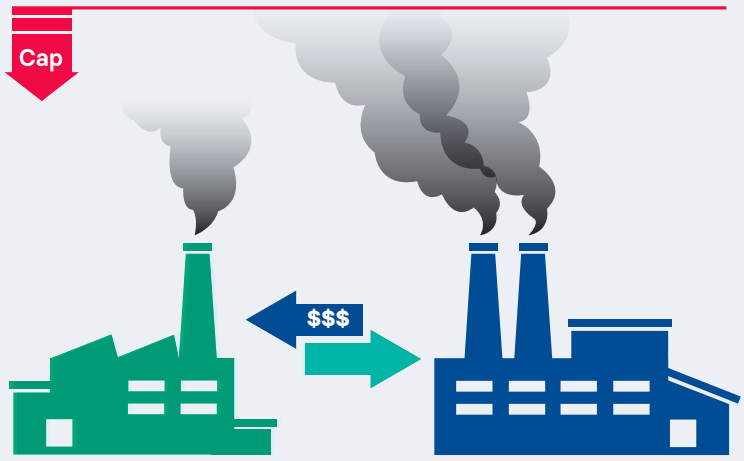
Carbon markets are an economic tool designed to reduce carbon pollution by charging polluters for what they emit. When well designed, they drive companies to find the cheapest, fastest ways to cut pollution and can even channel money toward funding low-carbon development and tropical forest preservation. An EDF study found that international carbon markets could double the world's emission reductions at no extra cost.

How do they work?

In their most common — and effective — form, called cap and trade, a government sets a declining cap on the amount of carbon dioxide that polluting industries can emit. It splits the cap into allowances good for one ton of CO_2 and sells or gives allowances to polluters. If a company doesn't use all its allowances, it can sell what it doesn't need to polluters who need more. Over time, the cap shrinks. Companies slash pollution in anticipation of this squeeze. Because it is the market that drives the reductions, companies have greater agency and the system has broader, more durable public support. Today, some form of carbon market exists in 37 countries. This doesn't include voluntary markets, a far smaller and less effective sector, which have no cap and lack government-set standards, oversight and enforcement.

CAP AND TRADE EXPLAINED

Big polluters pay cleaner companies for their unused pollution allowances. As the cap shrinks, pollution gets more expensive, encouraging cleaner operations.



But do they really work?

Yes, but the devil is in the details. Carbon markets must help put emissions on a path in line with global climate goals. And setting the cap at the right level is critical. In markets where the cap is too high and the price is too low it's cheaper for a company to pollute than reduce its emissions. Finally, oversight is key. As with any system of pollution control, if penalties are puny and enforcement lax, the whole system can unravel.

Any other catches?

Yes. While it doesn't matter to the climate where a ton of CO_2 comes from, it can matter for people living near pollution sources because reducing climate pollution can reduce air pollution too. With good design, carbon markets could lead to significant decreases in local air pollution in communities already facing multiple health and environmental threats.

Ok so who is getting it right?

After a bumpy start with a high cap and low prices, the European Union's Emissions Trading System, launched in 2005, has become highly effective with prices now around $100 per ton of carbon dioxide. The ETS is on track to halve emissions in the sectors it covers by 2030 (relative to 2005).

A successful cap-and-trade program is also at the heart of California's climate plan. The Golden State's carbon market required carbon pollution to be slashed to 1990 levels by 2020 and helped the state meet that goal four years ahead of schedule. California used that success to make even more ambitious climate goals.

What's next?

Vietnam, Indonesia and Colombia are all close to launching national carbon markets. And the LEAF Coalition is applying carbon markets to stop tropical deforestation. In the U.S., Washington state recently passed a cap-and-trade law and Oregon is working towards a similar program. The Regional Greenhouse Gas Initiative is a cap-and-trade program for the power sector encompassing 11, soon to be 12, Northeast and mid-Atlantic states and it's getting more stringent.

Last summer, after years of preparation and support from EDF, China, the world's biggest greenhouse gas emitter, launched its national carbon market. The market is by far the world's biggest, covering 2,162 power plants — about 40% of the nation's total carbon emissions. It is now expanding to include other heavy industries, starting with cement and aluminum.

Joanna Foster

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

STEVE AHLQUIST PHOTOGRAPHY PROVIDED BY CHILDHOOD LEAD ACTION PROJECT

Discrimination unearthed

A groundbreaking civil rights complaint demands lead-free water for all.

LIKE SO MANY CITIES ACROSS THE country, Providence, Rhode Island, has a lead pipe problem.

The EPA's action level for lead in drinking water is 15 parts per billion. But homes under the purview of Rhode Island's largest water utility, Providence Water, routinely have samples with levels over 100 parts per billion. It has exceeded the EPA's limit 15 out of the last 16 years and was recently ranked second-worst on a national priority watch list for lead.

Lead, a powerful neurotoxin known to cause irreversible organ and cognitive damage in children and adults, leaches from lead pipes into drinking water.

With an estimated 27,500 full or partial lead service lines — the pipes that bring water from the water main in the street to a home — in its service area, you'd think Providence Water would be in a hurry to eliminate the risk. It is not.

In common with many other utilities, when Providence Water performs work on water mains, it replaces the portion of the lead service line on public property, but leaves the part from the curb to the residence unless the customer pays for its replacement. At a cost of up to $4,500, the result is that low-income residents and many renters, the majority of whom are people of color in Rhode Island, are often left with sections of lead pipes.

"All families deserve lead-free drinking water, regardless of race, class or any other factor," said Laura Brion of the Childhood Lead Action Project, an organization that works to eliminate childhood lead poisoning in Rhode Island.

In January, the Childhood Lead Action Project, EDF and several other allies filed the country's first-ever civil rights complaint on lead pipes to the EPA. The complaint asserts that Providence Water is discriminating against the city's Black, Latino and Native American residents by requiring customers to pay part of the cost of replacing lead service lines. It calls on the EPA to order the utility to address its discriminatory practices.

The goal is to spur Providence Water to replace all lead service lines in its area, sharing the cost equitably among all ratepayers or, better, using federal funds made available through the infrastructure law. The Rhode Island Attorney General has written to the EPA in support of the complaint.

"If a gas line were leaking, no one would say 'the leak is on your side of the property line, you have to fix it,'" says Tom Neltner, EDF's chemicals policy director. "We would treat it like a public health emergency and replace it all. Lead pipes are a slow-burning emergency."

If successful, this pioneering approach could compel dozens of water utilities across the country to replace the lead service lines for their customers, regardless of ability to pay.

> **"It's time to get the lead out. Not just for some people in some neighborhoods. But for everyone."**
>
> **— Jennifer Ortega, EDF Environmental Health Analyst**

New lead service lines were banned nationwide in 1986. But an estimated 6 to 10 million remain, a toxic legacy poisoning drinking water in homes, schools and businesses across the country.

With the Biden administration committed to replacing all lead pipes, and $15 billion already set aside in the bipartisan infrastructure law to get the work started, public health advocates say it has never been more important to make sure that states use these federal dollars to replace pipes equitably.

"Providence Water's efforts to manage the lead problem, rather than eliminate it, aren't working," says EDF's Jennifer Ortega, who helped guide our work on the complaint. "It's time to get all the lead out. Not for some people in some neighborhoods, but for everyone."

Joanna Foster

Forgotten but not gone

At last, a plan to stop pollution from tens of thousands of abandoned oil and gas wells across the country.

By Shanti Menon

Contamination spreads from an abandoned well in North Dakota.

CHRISTINE AND DARYL PETERSON

POST FARM, IN LOST CREEK, WEST Virginia, has been in Bill Suan's family since 1868. The property was run down when he took over in the 1980s, but over the decades, Suan restored the land and the dilapidated outbuildings and brought back the cattle, which now roam over 480 rolling, woodsy acres. He fixed up the old farmhouse so beautifully that his daughter recently got married on the front porch.

But there's one problem Suan couldn't fix: abandoned oil and gas wells that pollute his land and water.

One well close to his house leaked oily, briny fluid for decades. "The calves would go and lick around the oil and get sick," says Suan (*pictured,right*), an EDF member. "Sometimes it would kill them."

There's another abandoned well at the back of his property, just uphill from a little creek. On wet days, gas bubbles up through the seams of a rusted pipe that stands on top of the well, making droplets of water fizz and dance.

Across the country, states have documented the location of more than 130,000 "orphan" wells — abandoned, unsealed wells whose owners went bust, vanished or were never recorded. Documentation is so poor, in fact, that experts estimate the actual number of orphans is far greater — likely more than 1 million across the country. They exist anywhere that anyone ever drilled for oil, from urban Los Angeles to suburban Pennsylvania, from Texas oil fields to the woods of upstate New York. They've been found under schools, near homes and in gardens.

A well close to Bill Suan's restored 19th-century farmhouse leaked for decades.

MOHAMMAD SHAHHOSSEINI/EDF

Unsealed, abandoned wells can leak oil, gas, super-salty brine and harmful chemicals into the soil and water and emit climate-warming methane into the atmosphere. Methane leaks from forgotten wells have even caused explosions, such as a 2021 blast that leveled three buildings in downtown Wheatley, Ontario, injuring 20 people. At least 9 million Americans live within a mile of a known orphan well.

This spring, for the first time, the federal government will start disbursing $4.7 billion to states to plug orphan wells.

"Orphan wells pose a threat to people and the environment across the country," says EDF attorney Adam Peltz. "But until now, the issue has never been on the federal radar."

Peltz helped engineer a bipartisan drive that secured the funding — one of the biggest environmental wins in the 2021 infrastructure act.

The roots of the problem

In the late 19th century, the Appalachian Basin was the heart of the global oil and gas industry, helping launch fortunes in towns such as Petroleum, West Virginia. Countless wells were drilled from eastern Ohio to western New York, then

abandoned when they stopped producing or when the owners ran out of money — long before recordkeeping and regulations kicked in.

But even in recent decades, state regulations have not been effective in preventing orphans. In West Virginia, a company can post a blanket bond of $50,000 to cover plugging of vertical wells, no matter how many it owns. "That bond might cover one or two wells, but we have companies that own 500," says attorney Dave McMahon, co-founder of the West Virginia Surface Owners Rights Organization, a group that helps landowners impacted by oil and gas operations.

When companies go bust, plugging is left up to the state. But West Virginia, with more than 6,300 documented orphans, plugged just three from 2018 to 2020.

For Suan, getting even one well with a known owner plugged took decades. "I would complain to the Department of Environmental Protection, and DEP would call the owner. They would come out and cover the oil up with dirt and straw, and then DEP would tell me it was OK," he says. "Then a month later I'd have to call again. This went on for about 25 years. Then I got fed up."

Finally, Suan called McMahon. In 2014, they successfully sued the DEP to force the owner to plug the well.

But the other abandoned well on Suan's property, the one near the creek, is an orphan, with no owner responsible for plugging it. "The inspector said it needs to be plugged," says Suan, pointing out oily, black mud around the wellhead. "But the DEP doesn't have the money to do it."

Funding brings hope

Things are changing. In February, the DEP called Suan, telling him they would plug the well this summer with money from the federal infrastructure bill. West Virginia will be eligible for more than $200 million in orphan well funding.

"This is going to be a great relief to hundreds of people who are concerned about their groundwater and property values," says McMahon, who worked with EDF to advocate for federal legislation, after 30 years spent working on the issue in West Virginia.

The federal program is designed to "get money out to the states and get people working fast," says Peltz. Twenty-six states have notified the Department of Interior that they intend to apply for funding. New Mexico, which has documented 1,700 orphans, expects to dramatically expand plugging. "This funding is going to allow us to supersize our program and make large impacts quickly," says the state's oil and gas agency director, Adrienne Sandoval.

Luke Plants, COO of Plants & Goodwin, a company that plugs wells across Appalachia, is also looking forward to federal funding. Plants, an Army veteran and MBA, joined the family business to create jobs in rural Appalachia. He expects to hire 10 to 20 people, on top of his current 60 employees, to take on the extra work. "We expect this summer to be pretty crazy," he says.

The road ahead

In truth, the $4.7 billion from Washington is just a downpayment. The cost of plugging documented orphans alone could exceed $8 billion, according to state estimates. And Plants cautions that companies like his can't grow fast enough to meet demand.

"You can't learn this job by reading textbooks," he says. "I won't let a supervisor out with a crew until they've been with me five or six years. It's a question of how far I can stretch my leadership and keep operating safely."

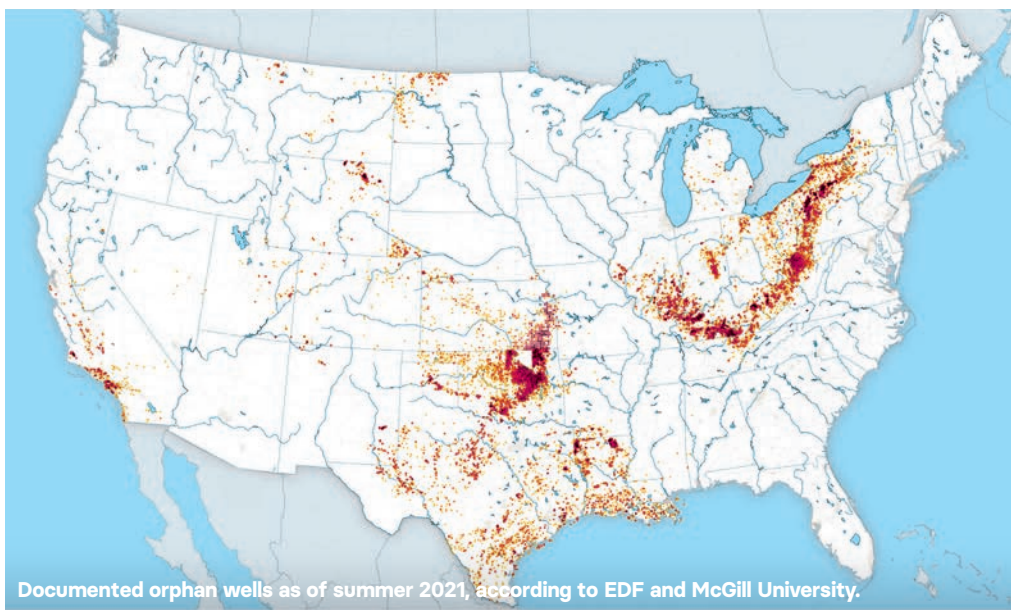
MOHAMMAD SHAHHOSSEIN/EDF

Bill Suan and his orphan well.

The federal package will reward states that come up with stronger regulations to prevent future orphans — like ensuring that oil and gas companies put more money into the system for plugging. EDF is developing possible reforms in eight states that are at highest risk for producing new orphans.

As for Suan, while he's looking forward to getting rid of his orphan well, he also knows there are plenty more in West Virginia that need plugging. "It's time to start cleaning up this mess," he says. ■

ORPHAN WELLS ACROSS AMERICA



CARTOGRAPHY BY NICK TROTTER MAPS AND ALAN BUCKNAM/NOTCHCODE CREATIVE

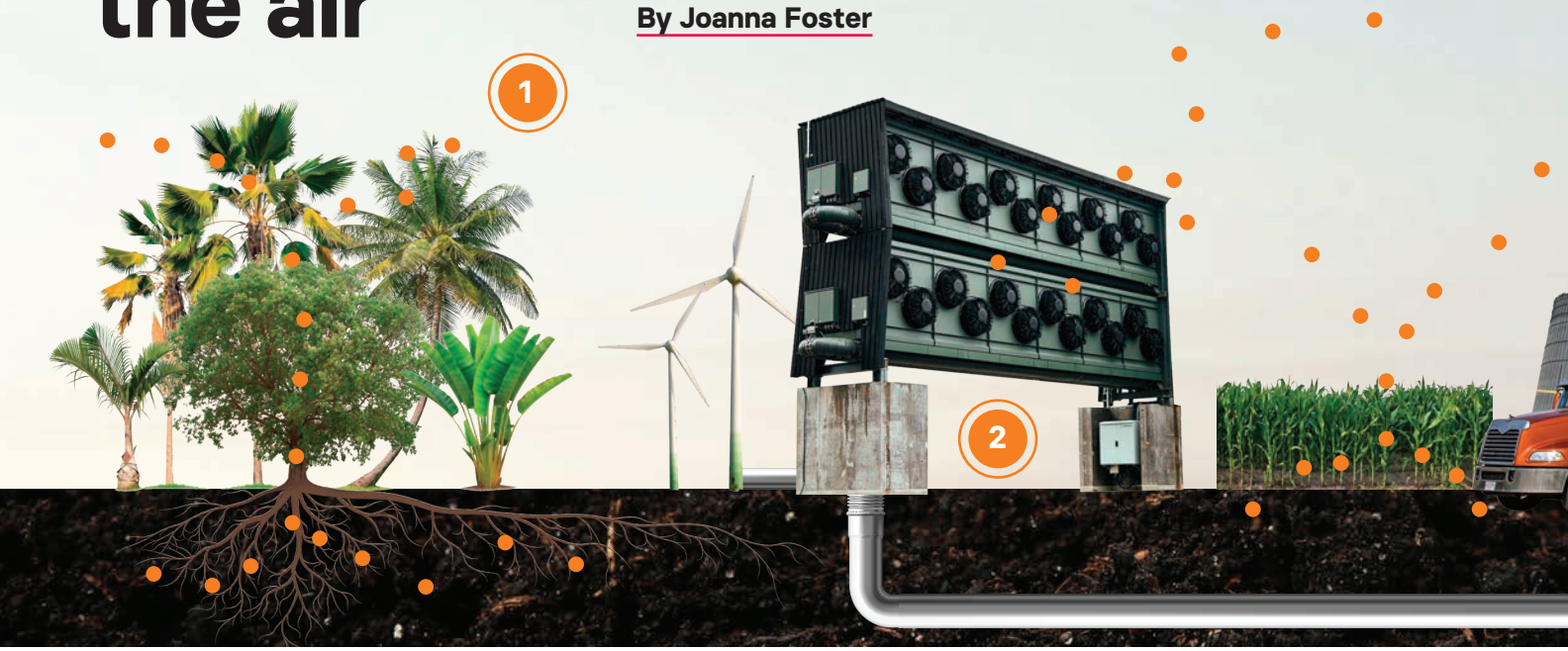
Documented orphan wells as of summer 2021, according to EDF and McGill University.

Dramatically reducing current greenhouse gas emissions is absolutely essential to slow global warming. But it's not enough. According to the National Academies of Sciences, Engineering and Medicine, the world must also remove around an additional 10 gigatons of CO_2 from the atmosphere each year by mid-century. That's twice what the U.S. emits from burning fossil fuels each year. Capturing CO_2 from the air and sequestering it long term is known as carbon dioxide removal or CDR. Here's what the future of cleaning up the atmosphere might look like.

Clearing the air

To keep the planet habitable we need to do more than stop climate pollution. We need to reverse it.

By Joanna Foster



1 Nature knows best

One of the best CDR strategies has been around for millenia: trees. Photosynthesis pulls CO_2 out of the air, locking the carbon up in trunks, branches, leaves and roots as the tree grows. The world's forests currently absorb around 16 gigatons of CO_2 each year, but about half that is lost to deforestation, fires and other disturbances. Ending deforestation, restoring cleared areas and allowing degraded forests to regenerate is a hugely effective, low-tech way to draw down CO_2.

Can we do it? The international LEAF Coalition, which EDF helped establish, has made an ambitious start. LEAF mobilized $1 billion in public and private money to stop deforestation and restore degraded tropical forests at the scale of whole countries or other large jurisdictions. Multiple forest countries have already signed up and many more are in line to participate. LEAF aims to channel tens of billions of dollars to halt all tropical deforestation by 2030.

2 Suck it up

Direct air capture, or DAC, is the mechanical process of sucking large amounts of air through a chemical filter to remove the CO_2. The CO_2 may then be pumped deep underground, a lot like fossil fuel extraction in reverse. There are a handful of small DAC plants already operating in Europe and North America. Iceland's Orca plant for example, which opened in 2021, can draw down 4,000 tons of CO_2 each year.

Is it enough? Short answer, no. We're going to need a lot more Orcas to make a difference. To hit net zero by 2050, the U.S. may need to vacuum up as much as 1,850 million tons of CO_2 a year, and DAC is currently expensive and energy-intensive. Biden's new infrastructure package does set aside $3.5 billion to create four DAC demonstration hubs around the country, each capable of drawing down at least 1 million tons each year. And the Department of Energy recently announced the Carbon Negative Shot, an initiative to drive down the price of CDR technologies like DAC to $100 per ton — approaching what polluters must pay for emitting CO_2 in the EU. Lots of other policies can help too — from incentives to direct government procurement.

3 More energy, less carbon

Bioenergy with carbon capture and storage, or BECCS, is the process of burning crops or agricultural residue for electricity or using them to produce biofuels, and sequestering the related emissions underground. It counts as CDR because crops draw down CO_2 as they grow and sequestration ensures it is never re-released. The National Academy of Sciences estimates that BECCS could sequester up to 5.2 gigatons of CO_2 globally every year without large adverse impacts on food security and biodiversity.

What's the catch? The math only works out if the emissions from growing, harvesting, transporting and processing the biomass don't outweigh the carbon sequestered. And it's very early days. Currently, there is only one large-scale operational BECCS facility in the country that actually stores the CO_2 it captures, rather than finding commercial uses for the gas. The food processing company Archer Daniels Midland operates a commercial BECCS facility in Decatur, Illinois, that locks around 519,000 tons of CO_2 underground every year. That's only about half what the company originally aimed to sequester annually. In England, the Drax power plant aims to become by far the largest BECCS facility in the world, able to store 8 million tons of CO_2 under the North Sea every year. But the project is in the pilot stage and beset with controversy. If BECCS is to play a significant role in drawing down atmospheric CO_2, we will need dedicated incentives and policies to encourage the market to scale quickly and, crucially, responsibly.

> **"Carbon capture is not a silver bullet, but the math for a stable climate doesn't add up without it."**
>
> **— Doria Gordon, EDF Lead Senior Scientist**

PHOTO ILLUSTRATION BY TINK TANK STUDIO

4 Soil and water

The world's soils and oceans are already massive carbon stores. But could they do more? EDF scientists are investigating the CDR potential of cultivating seaweeds in the open ocean and restoring mangroves and salt marshes. They're also examining how agricultural practices such as reduced tilling and use of cover crops impact the amount of carbon stored in farmland. Scientists estimate that agricultural soils could remove 4-6% of annual U.S. emissions.

What are we waiting for? There are multiple ecological benefits to restoring nature and improving soil health. But much more research is needed to establish which pathways in oceans and farmlands might be the most effective at capturing and storing carbon at the scale we need. "It's just too soon to say whether these approaches will make a real dent in greenhouse gasses," says EDF lead senior scientist Doria Gordon. "But we're working hard to find out."

Safety on your plate

Industrial processes, packaging and certain additives all contribute toxic chemicals to our foods. EDF works with regulators and companies to tackle the issue. Here's what you can do too.

In today's world, any bite of food, gulp of water or breath of air may contain all sorts of unhealthy chemicals, plastics and other contaminants. Unfortunately, we can't completely avoid all this dangerous junk, but we can reduce our exposure to toxic substances.

Diversify your diet

Heavy metals like mercury, arsenic and lead are in the soil, water and air. They can accumulate in the body and affect learning, behavior and attention. Some plants, including rice, absorb more of these harmful elements than others as they grow, so eating a variety of grains and vegetables can lower your overall exposure. For example, try substituting grains such as oats or barley for rice. When rice is on the menu, reduce your potential arsenic exposure by avoiding brown rice, since much of the arsenic is in the bran. Also, look for Basmati rice from California, India and Pakistan, which contain less inorganic arsenic than other rices.

Wash and peel

Root vegetables like carrots and sweet potatoes are excellent sources of vitamins and minerals, but they are also among the most contaminated by heavy metals. Buying organic won't help (though it may lower your exposure to pesticides). Wash produce carefully and peel root vegetables deeply to cut away chemicals concentrated in the skins, even if you grow your own at home.

Ditch the dyes

From gummy bears to sports drinks, synthetic dyes make foods look more delectable. But dyes that are widely used in foods are often synthesized from naphthalene, a chemical derived from petroleum. Studies have linked these dyes to increases in hyperactivity in children. If you buy packaged foods, choose those whose labels list only natural colorings from fruit and vegetable extracts. Best of all, make your meals from scratch, giving you control over the ingredients you use.

Detox your leftovers

Recent research has clarified the dangers of toxic chemicals in food containers. Phthalates, which make plastics more durable and flexible, can damage the liver, lungs and reproductive systems. Bisphenol A, used in rigid plastics and as a coating for metal food cans, can harm the immune system and disrupt the reproductive and endocrine systems. Store leftovers in glass or stainless steel containers, and never microwave food in plastic containers, since heat can cause chemicals in the plastic to leach into food.

Go slow with the fast food

In a study by Lariah Edwards, an EDF-George Washington University postdoctoral fellow, Edwards and her colleagues purchased 64 fast foods from major restaurant chains. They found that many popular menu items sampled contained phthalates and replacement chemicals which may pose a health risk. Fortunately, both hamburgers and chicken burritos — the two items in the study containing the highest levels of replacement plasticizers — are easy to make at home.

Tom Clynes

PHOTO ILLUSTRATION BY MONICA GOSLIN

Soldier, mom, clean-air campaigner

WHEN YARITZA PEREZ RETURNED to her home state of Florida after 12 years in the Marine Corps — including deployments in Iraq, Kuwait and Bahrain — she was looking for a new way to serve her country. She found it as an organizer for EcoMadres, an EDF-supported coalition that brings together Latina moms to address environmental issues that affect the health of their children and families.

"When I came home I was angry that our politicians weren't protecting us from climate change — in particular military veterans and Latino communities," Perez says, noting that most of Florida's 21 military bases are located on or near the ocean. "Sea level rise and extreme weather are straining our military readiness and putting the health and the safety of our military personnel at risk."

As part of a coalition of Florida environmentalists, scientists, educators and tribal leaders, Perez is working to build support among state and federal lawmakers for cutting methane pollution — the fastest way to slow climate change and protect public health.

"As a Latina, this issue is close to my heart," Perez says. "Close to 2 million Latinos live within a half mile of oil and gas plants, and many are leaking huge amounts of methane. Our kids are more likely to suffer from asthma because of air pollution."

EcoMadres launched in 2018 and are now active in seven states, where teams are working with Latino parents to support or introduce new legislation and policies at federal and state levels, holding lawmakers accountable on issues related to Latino communities, particularly the effect of the environment on their children's health. EcoMadres volunteers meet every few weeks for *cafecitos*, informal get-togethers that focus on environmental issues, action and advocacy.

"I never dreamed I'd be sitting down with members of Congress and working alongside other Latina moms with the passion and the commitment to build a more climate-resilient country," Perez says. "I feel like I'm exactly where I belong."

Read more about EcoMadres at **bit.ly/3hBKXL9**

COURTESY OF YARITZA PEREZ/MCAF

Perez at work for EcoMadres, founded by EDF affiliate Moms Clean Air Force.

INSIDE
Solutions

LIVE WEB EVENT

Meet EcoMadres!

For these passionate moms, the fight to cut air pollution, slow climate change and reduce toxic chemicals is a personal fight to protect their children's health. Hear how they're building a powerful green movement in the Latino community and prompting lawmakers to take action.

May 18, 2022 | 2-3pm ET/11-12pm PT
Sign up at edf.org/InsideSolutions

All in favor, say "climate!"

EVERY YEAR, HENRICO HIGH SCHOOL in Henrico, Virginia, hosts a Model UN conference, organized and led by the school's students. The conference simulates a session of the United Nations General Assembly, during which student "delegates" from area schools debate the major issues of the day.

This year, the theme of the event, which included some 200 delegates, was "The Fight for the Future," and climate change was the key issue. The student leaders also use the event to raise charitable donations for a single organization. This year, they chose EDF and raised more than $1,000 from students and conference sponsors. "We loved EDF's way of creating solutions with the help of science, economics, partnerships and advocacy," says Saanvi Tatineni, a Henrico senior and one of the conference leaders.

Saanvi Tatineni


A stable climate.
A stronger world.
A vital Earth. For everyone.
Together, we can edf.org/Vision2030
GETTY