



THE CHINA PARADOX

China burns as much coal as the rest of the world combined. It is also the world's largest investor in clean energy.

How EDF is helping it go green.

Page 8

6 Success!
National rules
on methane

12 A Cuban
scientist
speaks out

16 Defending
the environment
in Washington

18 Invasion
of the habitat
snatchers

Catching on

Near and far, sustainable fishing is taking hold. In the European Union, where fisheries are in deep crisis, EDF is working with fishermen to help them become stewards of the resource. Our aim is to change policies and practices and make sustainability the norm in countries that account for nearly two-thirds of the global catch.



Pulling together in time



WAS YOUR INTEREST IN ENVIRONMENTAL ISSUES SPARKED BY A WAKE-UP call? Mine was. As a boy growing up in Verona, NJ, I lived a few hundred yards from a lake and played on its banks daily. One day, I came upon scores of dead fish and frogs. A chemical spill upstream was the cause. I learned that day about the fragility of life. Such local problems are always important, but today our biggest challenges also have global dimensions.

No one entity—no country, no multinational corporation and certainly not Environmental Defense Fund—can address all of the global environmental challenges we face. It will take all of us working together to turn the tide. At EDF, our goals are bigger, bolder and more international than ever, and partnerships are the key to achieving them. Sometimes EDF takes the lead, but often we play a supporting role in places where others are more established.

Consider the world's oceans. EDF's work to rebuild fisheries—in the United States and elsewhere—with local and international partners has been extraordinarily effective. In Belize, for example, we teamed up with the Wildlife Conservation Society and local partners to establish a system of fishing rights that gives fishermen incentives to protect a key fishery for the long term. After just two years, fish populations are rebounding and illegal fishing has dropped 60%. That success led the government of Belize to ask EDF's help rolling out the system nationwide.

On global warming, one place where EDF has a long-standing presence is China. The road to stabilizing the world's climate leads through this rapidly changing nation, which burns half the world's coal and whose carbon emissions are 60% higher than those of the United States (*see cover story p. 8*). In 2013, EDF helped the Chinese government launch carbon emissions trading programs in five cities and two provinces, that account for about 25% of the nation's economy. This is a big first step toward the establishment of a national system for cutting greenhouse gas emissions—planned for 2016—and evidence that China is getting serious about climate.

Another example of EDF's expanding global role is the work we're doing in both the U.S. and Europe to reduce carbon emissions from buildings. Europe aims to reduce such emissions 90% by 2050, but private investment in energy efficiency projects is impeded by a lack of industry-wide standards. Our goal is to streamline how these projects are financed, resulting in buildings with lower operating costs and a smaller carbon footprint.

By sharing knowledge and learning from others, EDF and its partners are helping bring about change at a global scale. Together, we can help address the world's environmental ills. If we fail to cure them, it won't be because we lacked remedies. It will be because we didn't pull together in time.

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.

Our work is made possible by the support of our members.



On the cover: Napoleon Bonaparte once said, "Let China sleep, for when the dragon wakes, she will shake the world." China is now fully awake and its economy is booming.

But growth has come at a steep price in terms of pollution, public health and climate change.

Senior writer Rod Griffin examines how EDF is helping the country address those interconnected dangers by accelerating a transition to cleaner energy. *Page 8*

Cover illustration: shutterstock and Leland Goodman

Solutions


Editor Peter Klebnikov
Art Director Janice Caswell


Environmental Defense Fund
257 Park Ave. South
New York, NY 10010

Main number 212-505-2100
Membership questions 800-684-3322
or members@edf.org

WE WANT TO HEAR FROM YOU
Send feedback to address above or
email editor@edf.org

CONNECT WITH US ONLINE

 edf.org

 facebook.com/EnvDefenseFund

 twitter.com/envdefensefund

 linkedin.com/company/environmental-defense

©2015 Environmental Defense Fund.
Published quarterly in New York, NY
ISSN 0163-2566

New York / Austin / Bentonville, AR /
Boston / Boulder / Raleigh / Sacramento /
San Francisco / Washington /
Beijing, China / La Paz, Mexico / London

FIELD NOTES



GETTY

Sandhill cranes in migration over the Central Valley.

California farms grow habitat

Not long ago, the Sacramento River was rich with marshes that created vital seasonal floodplain habitat for waterfowl and fish such as the Chinook salmon. Today, following a century of agricultural expansion and reservoir construction, only 5% of these habitats remain.

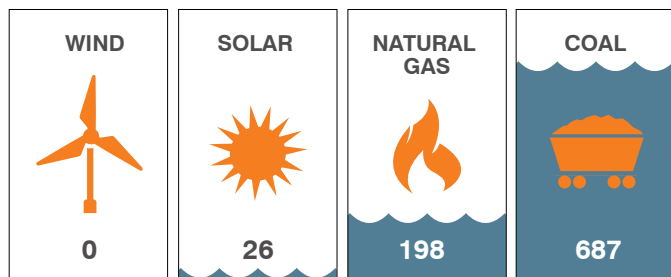
Now, EDF and partners are working with rice farms there, such as the 1,700-acre Knaggs Ranch, to keep water on the fields to support salmon nurseries and provide desperately needed habitat for migrating waterfowl and shorebirds. We're making the case to utilities and others needing to mitigate impacts

that paying farmers for conserving habitat on their land is cost-effective.

"Programs like this help us fulfill our responsibility to nature and to coming generations," says John Brennan, the Knaggs Ranch's co-owner. "This also helps diversify our income beyond farming."

Soon Brennan will enable his farm to earn additional revenue by reducing carbon emissions. California is poised to approve standards for rice farmers to generate carbon credits in the state's cap-and-trade market. Agriculture accounts for about 10% of America's climate pollution.

What are the thirstiest sources of energy?



Gallons of water used to power one home for a month

SOURCES: NATIONAL RENEWABLE ENERGY LABORATORY, 2011 REPORT; EIA.

BY THE NUMBERS CLIMATE TRUTH OR CONSEQUENCES

\$889 million

Amount the Koch brothers network is projected to spend to influence legislation and political campaigns in 2016

67%

Americans who support carbon rules, even if this means higher utility bills

31%

Amount Denmark's carbon emissions have gone down since 1990

13 minutes

Time devoted to climate change by *ABC Evening News* in all of 2014

7°F

How much hotter the planet will be over pre-industrial levels in 2100 if we do nothing

SOURCES: THE NEW YORK TIMES, YALE PROJECT ON CLIMATE CHANGE COMMUNICATION, DANISH ENERGY AGENCY, MEDIA MATTERS, IPCC WGI

EDF's winning model for clean air



ISTOCKPHOTO

New Yorkers today are breathing the cleanest air in 50 years. Soot pollution from buildings has fallen by more than 50% since 2011 in the city, preventing an estimated annual 800 deaths and 2,000 hospital visits due to lung and heart disease. Why? Largely because of a partnership between EDF and New York City called NYC Clean Heat. In 2012, the program launched a \$100 million financing program to help buildings phase out the dirtiest heating oil. So far 4,000 buildings have converted to cleaner fuel. The initiative has won two awards for innovation and design and has been so successful that Mayor Bill de Blasio is using it as a blueprint for retrofitting 20,000 buildings for energy efficiency.

Congress vs. a rare bird



SHUTTERSTOCK

The greater sage grouse, an icon of the vanishing prairie, needs help urgently, but Congress has delayed listing the bird as threatened or endangered. EDF is not stopping conservation efforts: Our habitat exchange program is designed to help species with or without a listing.

>>> READ MORE >>>
edf.org/sagegrouse

The sea's great predators face a new threat: ocean acidification



CORBIS

Acidifying waters could interfere with the extraordinary sense of smell that has allowed sharks to thrive for millennia.

During their 420 million years on Earth, sharks have evolved a hyper-acute sense of smell that helps them home in on prey. Some species can smell a drop of blood in an Olympic-sized pool. But a new study published in *Global Change Biology* shows that ocean acidification, caused by global warming, could interfere with their sense of smell and diminish their ability to hunt.

Sharks have survived cataclysmic events that killed off dinosaurs. But human activity has pushed these magnificent predators to the brink. Oceans absorb large amounts of atmospheric carbon dioxide, turning them more acidic. Today's rate of change is so rapid, sharks may not have time to adapt.

Restoring populations of sharks can help them better withstand the impacts of climate change and builds resiliency in the entire ecosystem. "Careful fisheries management combined with marine sanctuaries can help sustain shark populations," says EDF

scientist Dr. Jake Kritzer. We are working with Caribbean nations to identify and protect shark nursery grounds. But the best solution is to reduce carbon emissions by implementing policies such as the Clean Power Plan.



RECYCLING, London style

With the spread of mobile phones, London's iconic red telephone booths have fallen into disuse. Today, some are being converted into solar charging stations.



REDFX PICTURES

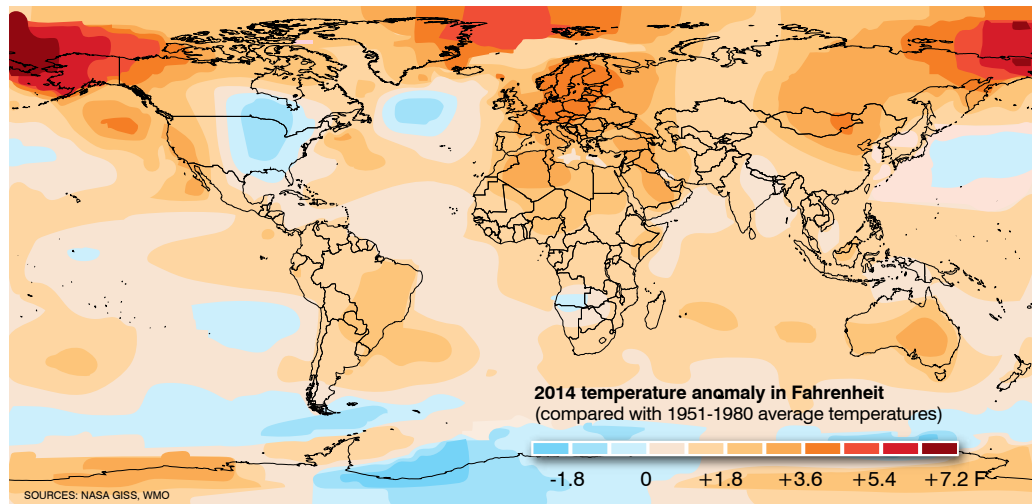


A wind turbine grows in Brooklyn

New York City has installed its first commercial-strength wind turbine. Powered by steady breezes 160 feet above the Brooklyn waterfront, the turbine helps run a recycling plant. "If you can do it in New York, you can do it anywhere," says project founder Thomas Outerbridge.

Deniers take note: 2014 broke heat records

Last year was the hottest on Earth since record keeping began in 1880; 14 of the 15 warmest years occurred since 2000. Only a few areas had below average temperatures.



Taking action on methane

By Leslie Valentine



For too long, the dangers of methane pollution were all but ignored. EDF helped put the issue on the map. Today methane—the chief component of natural gas—accounts for one-quarter of global warming. In January, the White House announced a bold target to slash methane. What will it take to get there?

WHAT'S COLORLESS, INVISIBLE to the naked eye and dozens of times more potent than CO₂ as a global warming force? Answer: methane. Natural gas, which is mostly methane, is abundant and cheap, and we depend on it for cooking and heating our homes. It also produces 27% of the electricity we use in our homes and businesses.

Natural gas, when burned, emits about half as much carbon dioxide as coal. But *unburned* methane—which leaks from wellheads, processing plants and pipelines all along the supply chain—is 84 times more potent than CO₂ as a global warming gas during the first 20 years after it is released into the atmosphere. Even small amounts vented or leaked can undermine the climate advantage natural gas has over other fossil fuels.

In fact, one-quarter of the warming we will experience over the next couple of decades from today's emissions will be due to methane. Reducing methane

emissions can help stave off disastrous events such as increased droughts and heat waves. And the best, most cost-effective way to do that is by cutting fugitive emissions from the oil and gas sector.

An independent study commissioned by EDF found that the industry could cut methane emissions 40% or more for less than a penny per 1,000 cubic feet of natural gas produced by replacing leaky valves and properly maintaining pumps and other devices.

"Reducing methane is not rocket science," says EDF's Mark Brownstein, who leads our natural gas program. "It's largely a plumbing problem, and plumb-

ing is dead simple."

Until recently, there were no legal limits on such pollution from most oil and gas operations. EDF has been a leader in bringing the issue to the public's attention and pushing for strong federal standards. We marshaled the science and made the case to the White House that dramatically cutting methane emissions is not only achievable but cheap. We also mobilized our supporters, including those of Moms Clean Air Force. Together we sent more than 100,000 emails urging that the Obama administration take action to control methane.

Thanks in part to EDF's efforts, policy makers have woken up. In January, the White House announced a goal of



Remote areas of Wyoming that once had clean air are now experiencing high levels of air pollution. Natural gas and oil production is virtually the only industrial activity in the area.

ISTOCKPHOTO

reducing emissions of methane from the oil and gas industry to nearly half of 2012 levels by 2025. Once in place, the rules would be the first-ever federal requirement to control this dangerous pollutant under the Clean Air Act.

Sen. James Inhofe (R-OK), chairman of the Environment and Public Works Committee, blasted the plan for imposing “a mandate designed to stifle our domestic energy industries.” The oil and gas lobby and its backers in Congress say voluntary controls are sufficient.

“Reducing methane is not rocket science.”

In fact, fewer than 30 of 6,000-plus oil and gas operators across the nation have taken steps to lower their emissions. If voluntary measures worked, we wouldn't need federal standards.

“It's unrealistic to think an industry of this size would be able to police itself,” says Brownstein. “Regulations are absolutely necessary to assure that all companies play by the same set of rules.”

Of course, good regulation rests on good science, and until recently there was little reliable data on just how much methane is leaking nationwide. In 2012, EDF launched the largest-ever effort to track leakage along the entire natural gas supply chain. We brought together nearly 100 partners from academia and industry to conduct 16 field studies, which are being published in peer-reviewed journals.

As part of our strategy to protect communities from unacceptable impacts to

health and the environment from oil and gas activities—and build momentum for federal action—we set out to secure strong rules in states where production is most active.

In Colorado, for example, where toxic smog threatened communities, EDF was asked by Colorado Gov. John Hickenlooper to help find a solution.

Working with Conservation Colorado, Earthjustice and other groups, we found common ground with three of the state's biggest oil and gas producers. This resulted in the nation's first rules directly limiting methane emissions and other pollution such as ozone and benzene.

These measures will cut methane as well as reduce smog-forming pollution annually by an amount equal to that produced by all the cars and trucks in the state. We also worked with local groups in Wyoming, Ohio and California to get strong air pollution rules in place there.

In response to the White House announcement, EPA will propose regulations this summer for emissions of methane and other dangerous pollutants from new and modified oil and gas sources. “This is a good first step,” says Krupp, “but we will make sure the administration follows through on its commitment to cut emissions by nearly half.” The rules are not expected to cover facilities already in operation, which account for 90% of the industry's methane emissions. We're urging EPA to set rules for existing wells, pipelines and facilities.

“There's no reason to wait ten years to fix a problem that can be addressed right now,” says Krupp.

Going high-tech for the environment

Finding natural gas leaks used to be an onerous task involving workers with hand-held devices. Those days may soon be over. Technology is revolutionizing the way pollution is measured. Satellite sensors in space make methane hot spots visible, and on the ground, infrared cameras capture plumes escaping from

oil and gas production equipment. But infrared cameras aren't cheap, and companies need ways to monitor leaks in real



time. That's why EDF challenged tech developers to design a kind of smoke alarm for methane leaks that can be deployed at drilling sites. Our team is on the second round of testing four technologies from applicants around the world.

It's not just drilling equipment that leaks gas but also old pipelines. EDF teamed up with Google Earth Outreach to find and map leaks under city streets using Street View cars. We then analyzed the findings and made them available to the public (edf.org/methanemaps).

Remember when you first realized we have to protect our environment?

It still needs you.

Make a gift to EDF in your will or from your IRA.
legacy@edf.org
Toll-free: 877-677-7397
Direct: 212-616-1201



China: Crisis and opportunity

By Rod Griffin

After years of “growth at any cost,” a rising middle class in China is demanding a shift to clean, sustainable development. EDF is helping Beijing deliver.



WHEN WORLD LEADERS convened in Beijing for the Asia-Pacific Economic Conference (APEC) last November, the skies were uncharacteristically blue: a fitting backdrop for President Obama and President Xi Jinping's historic announcement to cut greenhouse gas emissions and boost clean energy use. It was the first time China has publicly committed to a time-frame (around 2030) for capping its carbon emissions.

The blue skies were no coincidence. For the week preceding the APEC summit, some 10,000 factories within a 400-mile radius of the city were shut. Schools and government offices were closed, and nearly 12 million vehicles were ordered off the road. Even outdoor barbecues were snuffed. Air pollution in the capital quickly fell to the lowest level in five years.

After the dignitaries left, normal life resumed—and so did pollution. Today, Beijing's average air quality reading for particulates (PM 2.5) is five times that of Los Angeles. And Beijing isn't even on China's top-ten list of polluted cities.

For many Chinese, "APEC Blue" has become an ironic catchphrase for anything that is beautiful but temporary. Sarcasm aside, the clear skies over Beijing showed what's possible when China's central government decides to act.

Even before the U.S.-China announcement on greenhouse gases, change was in the air. In a major speech in March 2014, Premier Li Keqiang declared "war on pollution." Coal use declined in 2014, the first annual drop this century. The government plans to spend \$275 billion on efforts to reduce air pollution over the next three years, and generate 20% of its energy from renewables and nuclear by 2030.

The question is how quickly China can turn the corner. "We cannot stabilize our planet's climate without a targeted and rigorous campaign to curb climate pollution in China," says Dr. Daniel Dudek, who heads EDF's China program.

A long-standing partnership

In 1990, Dudek pioneered the U.S. emissions trading program to cut acid rain from power plants. The program, written into the 1990 Clean Air Act, spurred innovation and cut sulfur pollution in half, at a fraction of the projected cost.

Impressed by the results, Beijing

called on Dudek to help design China's first experiments with economic incentives for pollution control. Early successes in cutting SO₂ followed by experiments with capping carbon, have prompted the government to expand the program and establish a registry to track reductions.

With support from EDF, the country has launched carbon emissions trading programs in five cities and two provinces, home to 250 million people. These programs cover more than 2,000 sources, representing 16% of China's greenhouse gas emissions. China says it will roll out national emissions trading in 2016.

EDF's goal is to help China develop the infrastructure, policies and regulations needed to place a legally binding cap on emissions and shift the country's economy as quickly as possible toward a low-carbon future. Dudek serves on China's highest international advisory body on environmental affairs, which reports directly to China's premier.

"EDF first introduced market mechanisms to China's power sector back in 1999," says Zhixuan Wang, secretary general of the China Electricity Council, an industry association of China's power sector. "Since then, they have brought innovative ideas to China and provided substantial research support for energy efficiency and pollution reduction. This has greatly helped reduce pollution in China's power sector."

In Shenzhen alone, the government reports that CO₂ emissions fell by more than 3.8 million tons in 2013, the first year of the pilot program, as compared to 2010. That's the equivalent of burning five

A LAND OF EXTREMES

26%

China's share of global greenhouse gas emissions (vs. 16% for the U.S.)

1.2 million

Number of annual premature deaths in China that air pollution contributes to

154 million

Cars in China—up from 16 million in 2000

67%

Energy produced from coal (vs. 20% for the U.S.)

\$90 billion

Investment in clean energy in 2014, nearly twice as much as in the U.S.

45%

China's share of the world's new wind energy production in 2013

SOURCES: 1) EIA; 2) THE NEW YORK TIMES, THE LANCET; 3) CHINA MINISTRY OF PUBLIC SECURITY; 4 & 5) BLOOMBERG; 6) GWEC

billion fewer pounds of coal (enough to fill 21,000 rail cars). "Obviously more needs to be done," says Dudek. "We're laying the groundwork."

Cracking down on polluters

Much of the choking pollution that regularly blankets the country's north, including Beijing and the port city of Tianjin, comes from Hebei province, the center of



Emission statement: Face masks are a ubiquitous sight throughout China.

China's steel and cement industries. Hebei has seven of the country's ten most polluted cities. On bad days you can't see the other side of a four-lane road.

A study by the U.S. National Academy of Sciences found that air pollution in the north of China reduces life expectancy by five-and-a-half years. On some days, emissions blowing across the Pacific from China account for up to a quarter of California's airborne sulfur pollution.

For China, the moment to address such costs is now. A 2013 poll by *People's Daily* named the environment as one of the top issues citizens want the government to deal with. *Under the Dome*, a new documentary about China's pollution, racked up more than 200 million views in just five days.

Historically, penalties for polluting in China were so low—the maximum was \$160,000—that there was little incentive to clean up. In 2014, China tightened penalties on polluters, a reform advocated by EDF for more than a decade. The ceiling on fines has been lifted, officials are being held more accountable and citizen groups have more power to sue. The reforms, which Reuters called “the most sweeping revisions to the law in 25 years,” are modeled on an EDF pilot enforcement project in Chongqing.

The progress isn't just on paper. In December, a court in eastern China



In 2014, the Chinese economy overtook the U.S. economy as the world's largest.

ordered six companies to pay fines totaling \$26 million for discharging waste acid into two waterways. The fine is the biggest ever in a Chinese environmental pollution case and signals a profound change in attitude.

China's environmental transformation will be implemented by a new generation of enforcement officers, many trained through a program EDF set up with Peking University. So far some 25,000 professionals (nearly one-third of enforcement officers nationwide) have

graduated from our program and fanned out across the country to help protect natural resources.

Green supply chain

Another way to reduce pollution is to partner with companies that directly influence China's supply chain. “By finding these leverage points, we can rapidly scale change,” says Dudek.

Our Green Supply Chain Initiative uses the purchasing power of the government and multinationals to improve

Cultivating climate solutions

Agriculture is still a pillar of the Chinese economy, and perhaps the sector most vulnerable to climate change. With more than 700 million people living in rural areas—and 100 million of them living below the international poverty line—reducing rural poverty is a top priority for China.

“The desire for a higher standard of living is part of the human condition,” says Dr. Zhang Jianyu, EDF China's managing director. “The path toward climate stability and the path out of poverty have to be the same.”

To tackle these dual threats, EDF partnered with the State Coun-



EDF programs help farmers like these earn income by reducing carbon emissions.

cil's Poverty Alleviation Office, which has representatives in every county. Together, we've created a program in which poor farmers in Xinjiang, Sichuan and Shaanxi provinces can earn income by reducing carbon emissions through improved agricultural practices such as no-till farming and turning waste into energy.

The national government last year linked poverty alleviation with climate change and committed to working with us to support pilot projects. Sustainable farming reform in China could keep as much as one billion tons of greenhouse gases out of the atmosphere annually.

One such project is in Hebei province, where we are replacing traditional coal-burning stoves with clean biomass stoves that burn bricks of compressed straw. The reduction in household air pollution could help avoid hundreds of deaths. The new stoves cut carbon emissions 60% and sulfur dioxide emissions by 90% compared to those fueled by coal. So far, 3,700 households have the new stoves installed, with a goal of 500,000 by 2017.

The local government will cover half the cost of the stoves—about \$200 each—with farmers being responsible for the rest. EDF's role was to design the project and link carbon credits to the emerging carbon market. The sale of credits should enable farmers to recoup their investment within two years. “It's an investment in human health—and the health of the planet,” says Zhang.

energy efficiency and cut carbon pollution. For example, we're working with Lianhua Supermarket, a subsidiary of Brilliance Corporation, one of China's largest retailers, to develop guidelines for green stores and supply chain management. By adopting energy efficiency measures such as improved refrigeration and lighting, Lianhua demonstrated it can cut its energy use by as much as half.

In Wuhan, the most populous city in central China, an environmental enforcement officer frustrated by his inability to stop illegal pollution from a factory turned to EDF for help. We showed him how to enlist a leading buyer of the factory's products in support of his campaign. The buyer demanded that the factory clean up its act.

"You have to get your hands dirty at the local level," says Dudek, "to empower local champions, the people who can stand up and tell their story."

EDF also placed six Climate Corps fellows, all Chinese nationals studying in the United States, in multinational companies in China, including Apple, Walmart and Cummins. EDF's Climate Corps program trains top graduate students and places them with companies where they look for ways to increase energy efficiency and reduce emissions.

"Climate change is the biggest challenge of my generation," says Yinghuang Ji, a Ph.D. student at Columbia University who worked as a Climate Corps fellow at Walmart in Shenzhen and Shanghai last summer. She analyzed 11 factories that supply Walmart, and identified energy efficiency improvements that—if implemented across all of Walmart's factories in China—could save the equivalent amount of electricity used annually in more than 400,000 Chinese homes.

Danger and opportunity

China has reached a critical moment of both danger and opportunity. Fetid, unhealthy air is the reality today, but the country is moving rapidly to grasp the opportunity of a low-carbon future. If Beijing follows through with its vision, China could do for clean energy what it's already done for consumer electronics—put it within reach of everyone. "There can be no U.S.-only solution to the global climate crisis," says Dudek. "The path to a safe climate future goes through both Washington and Beijing."

Will China meet its aggressive 2030 targets? We have reason to be optimistic.

The government has proven it can scale innovation with extraordinary speed. In 2013, China installed more solar capacity than the U.S. installed over the previous six decades. China has also become the world's leader in wind power. And new national energy efficiency standards for refrigerators and air

conditioners have by themselves saved as much energy as Three Gorges Dam produces, according to some accounts.

EDF is committed to helping China reach its ambitious goals. Our hope is that one day in the foreseeable future APEC Blue will no longer be a joke, and Beijing's skies will be blue year-round.



Change agents: Dudek (center, in white shirt) and the EDF China staff in Beijing.

EDF's work in China



Our projects encompass provinces that account for 40% of China's GDP

- Carbon trading** EDF is providing technical assistance and training to all seven carbon trading pilots.
- Low-carbon farming** Farmers in our low-carbon farming pilots are rewarded for adopting climate-friendly agricultural practices that reduce carbon and increase efficiency.
- Green supply chain** Our green supply chain pilots give factories an incentive to slash energy use: if they want to win contracts to supply big purchasers, they must meet environmental requirements.

Letter from a Cuban scientist

By Dr. Jorge Angulo



WHEN I FIRST HEARD THE United States and Cuba would reestablish diplomatic relations, I was very happy. I think our people—especially our scientists—have even more in common than we realize. As a marine scientist, I've seen international collaboration work. Cuban and American scientists, particularly those from EDF, have been quietly collaborating for more than a decade to protect Cuba's rich natural heritage and the shared ocean waters that connect our two countries.

Now there will be new opportunities to expand this cooperation. But the thaw will also mean more tourists and new development, which will put greater pressure on coastal areas. Growth can be great news for creating jobs, but tourism and conservation must go hand in hand.

In Cuba, we are determined to do the right thing for our economy and our environment. Last month experts from EDF and Florida's Mote Marine Laboratory joined me and other Cuban scientists to advance a long-running study of sharks and coral reefs in the Gardens of the Queen National Park, 50 miles off Cuba's southern coast. This marine park is the Caribbean's largest and, many would say, its most spectacular. Elkhorn coral—almost gone from Florida waters—thrive there. Apex predators, like Caribbean reef and silky sharks, are abundant and help keep the reef's ecosystem healthy.

These and other sharks are in trouble elsewhere, and we need to learn how we can help them. Our work in the Gardens

will help managers develop strategies to rebuild shark populations as well as conserve healthy reefs. Our coral research could help American scientists restore damaged Florida reefs.

“Cuba could be a haven for sustainable tourism.”

Beautiful ecosystems like the Gardens could also offer my country alternatives to traditional tourism. Many Caribbean sun-and-sand vacation spots have depleted their natural resources. Cuba could be a haven for sustainable tourism. Visitors could go birding or on manatee or whale shark tours. The possibilities are endless (*see also edf.org/ecocuba*).

A lot depends on fishermen. With EDF we're working to improve the livelihoods of fishermen by rebuilding fish populations. We're creating plans to end overfishing, manage coral reefs and mangrove swamps, and protect communities from rising seas, the result of a warming climate.

As part of ongoing efforts to improve fishery management, my Center recently teamed up with EDF to conduct a “floating workshop” on fishing methods in Cuba's Gulf of

Batabano. For four days, scientists, conservationists and fishermen from the United States, Cuba and Mexico spent time on Cuban fishing boats.

Many of the fishermen had never met scientists before, but their knowledge proved invaluable. They traded fishing tips and compared gear. We all talked about how to sustain the resources of our beautiful oceans for future generations. From this, we all learned to trust one another. I believe trust is the seed of anything you want to do with humans. Throughout the workshop, I was struck by how political differences didn't matter.

At the end of our stay, a Cuban tuna fisherman told us, “We share one ocean.” For me, that tells the story.

Jorge Angulo is Director of Conservation at the University of Havana's Center for Marine Research.



Angulo: Saving ecosystems that have vanished elsewhere.

BP blowout, five years later



It's April 2010 and a disaster unfolds. Why are we still unprepared in 2015?

The BP-Deepwater Horizon oil disaster in the Gulf of Mexico dealt a crushing blow to coastal Louisiana, a region already battered by hurricanes and long-term loss of wetlands. What have we learned? What progress have we made? An update:

Pushing BP to accept full responsibility.

The BP civil trial determined that the oil company was liable for up to \$13.7 billion for violating the Clean Water Act and acting with “gross negligence.” EDF is pushing for the maximum penalty and demanding that BP halt its delaying tactics so “real resources can finally be put to work restoring coastal Louisiana,” says Steve Cochran, director of our Mississippi River Delta Restoration program.

A one-two punch for communities.

Louisiana is losing a football field’s worth of land every hour to erosion resulting from years of abuse. Land that used to be farmed is today underwater. As wetlands disappear, says Cochran, “people who can afford to are moving, leaving behind those least able to cope—the poor and the elderly.” EDF is working to change this dynamic, but restoration takes time—and money.

The BP funds provide hope. EDF and our partners are pushing for 19 critical projects to jumpstart restoration. Louisiana’s Coastal Master Plan, which we helped to develop, would begin to

reverse land loss within 30 years. Fixing the coastline will be expensive—but if successful, the investment will “pay dividends for generations to come and be a model for reviving other threatened deltas,” says Natalie Peyronnin, EDF’s science policy director for delta restoration.

Safety regulations and planning. The federal response to the spill was haphazard and largely ineffective. Government regulation still lags far behind industry’s rush to drill in fragile areas such as the Arctic, where the science and infrastructure for managing an oil spill are virtually nonexistent, according to a new study from the National Research Council.

There is some progress: EPA has proposed tighter guidelines for the use of chemical dispersants in spills, citing lessons learned from the BP disaster.



Some 400 species of birds, like this roseate spoonbill, depend on a healthy delta.

A Gulf restored?



Rader: “The biggest damage lies hidden under the surface.”

Dr. Douglas Rader, EDF’s chief oceans scientist, spent much of 2010 responding to the BP-Deepwater Horizon spill. Solutions sat down with him to get his take on the current state of the Gulf.

Q: What were the long-term impacts to marine ecosystems?

Rader: It will take years before scientists get a full picture of the cascade of effects from the spill. I am convinced that the creatures most affected were those that are the least known—small creatures in sensitive early life stages—floating larvae of shrimp, crabs, Atlantic bluefin tuna and reef fishes—and creatures of the deep. A big question is how the recently discovered giant “bathtub ring of oil” on the seafloor will affect ancient deepwater corals and other deep-sea animals. Oil left behind works its way up the food chain. The harm to sperm whales in the northern Gulf came not from direct oiling, but through their underwater prey.

Q: Why tighten standards on chemical dispersants?

Rader: While dispersants may help in some situations, their use in deepwater is questionable. It greatly expanded the zone of subsurface exposure to toxic chemicals.

Q: Is the United States now better prepared for such a spill?

Rader: Insufficient progress has been made in understanding key risks as well as protection and response. This is of great concern as we drill in unfamiliar but increasingly sensitive and dangerous places like the Arctic.



ALAMY

Carbon dioxide was last at today's level during the Pliocene, when this carnivorous *Titanis walleri* was one of the neighbors.

Avoiding the really scary stuff

EDF economist **Gernot Wagner** has teamed up with Harvard professor **Martin Weitzman** to write *Climate Shock*, a new book that zeroes in on the extreme catastrophes that could result from unchecked climate change—and how we can prevent them. Wagner shared some thoughts with Solutions.

The last time our planet had an atmospheric level of carbon as high as it is now, sea levels were up to 66 feet higher. Camels lived in Canada. The geological clock said, “Pliocene.” So we have plenty of reasons to act. The longer we wait, the more likely it is that one of the extreme events described in our book will happen.

If we have a 10% chance of being in a fatal car accident, we take precautions. But if we calculate a 10% chance that unchecked climate change could lead to catastrophes like entire cities going underwater, what then?

We need to think about climate change the way we think of insurance. In the end it's risk management—on a planetary scale. And it's not really radical. We insure our cars and homes against the worst that could happen. Why don't we insure our planet?

We have the tools to act, but only if we adopt policies to guide the economy away from the current fossil fuel-driven, high-carbon, low-efficiency trajectory and instead make the sustainable, low-carbon, high-efficiency path the profitable one.



>>> GET THE BOOK >>> edf.org/climateshock

A call to action: tougher smog standards



Dr. Elena Craft is an EDF health scientist who works to reduce harmful air pollution from energy use and transportation.

A brown soup of pollution—familiarily called smog—hangs over many American cities, especially during warmer months. Smog, or ground-level ozone, is formed when emissions from power plants, factories, cars and other sources react with heat and sunlight. When inhaled, smog irritates our airways and increases our risk of serious heart and lung diseases.

EPA has proposed a new rule that would in fact cut down on smog pollution, but EDF is urging the agency to go even further. Although EPA's proposed limit of 65 to 70 parts per billion (ppb), down from 75 ppb, would undeniably help, EDF, the American Lung Association and others are calling for a threshold of 60 ppb.

Austin-based EDF health scientist Elena Craft used strong words when testifying in favor of stronger standards at a public meeting in Arlington, TX. “Exposure to ozone can harm the respiratory system and aggravate asthma and other lung diseases. It is linked to early death from respiratory and cardiovascular causes,” she said. “As a scientist, and as a mom of an 8-month-old baby boy, I applaud EPA's efforts in protecting public health. Setting the ozone standard to 60 parts per billion would help those of us in Texas and across the country breathe easier.”

>>> TAKE ACTION >>>
edf.org/supportcleanerair

Farming and clean water

Excess fertilizer that runs off farms contains chemicals that can poison drinking water and cause dead zones in lakes and oceans. EDF's David Festa has a solution. edf.org/cleanwater



Oil prices and clean energy

Falling oil prices have not dampened U.S. demand for energy efficiency and renewable power. In fact, renewables are growing faster than ever. Here's why: edf.org/oilprices



EDF Voices blog

Find out what our experts are talking about. Visit EDF Voices at edf.org/blog.

Finally, a real chance for chemical safety reform



Dozens of toxic chemicals are typically present in babies in the womb.

In products they use every day, Americans are exposed to thousands of untested chemicals. A new law could change that.

THE NO. 1 SONG WAS “DISCO Duck,” the hot TV show was “Charlie’s Angels” and Gerald Ford was President when America’s main chemical safety law was enacted. The bill Ford signed on October 11, 1976, the Toxic Substances Control Act (TSCA), was—from the beginning—seriously flawed. Among many other problems, it imposed a nearly impossible burden on government to prove harm in order to control or replace a dangerous chemical.

Yet in the almost 40 years since, the crucial reforms to solve those problems

were never made.

That could finally be about to change. Thanks to bipartisan leadership on Capitol Hill and hard work by EDF and others, we have the best chance in a generation to fix this badly broken law.

In March, Senators Tom Udall (D-NM) and David Vitter (R-LA), together with seven Democratic and eight Republican co-sponsors, introduced the “Frank R. Lautenberg Chemical Safety for the 21st Century Act,” named for the late New Jersey senator who long championed TSCA reform. This bill, which EDF helped negotiate along with other stakeholders, is a huge improvement over the existing law. It would transform the way EPA evaluates and manages harmful chemicals, sweeping away legal barriers that have made it so hard to remove them from the market.

“Americans are exposed to thousands of chemicals every day—some of them linked to cancer, infertility, diabetes, Parkinson’s and other illnesses,” said Dr. Richard Denison, lead senior scientist at EDF. “This legislation provides EPA with the tools it needs to better protect American families—especially pregnant women and infants who are most vulnerable.”

Among other changes, the bill would:

- Mandate safety reviews for all chemicals in active commerce
- Require a safety finding for new chemicals before they can enter the market
- Require protection of vulnerable populations
- Set judicially enforceable deadlines for EPA decisions
- Collect fees from companies to allow EPA to do its job

“Rare political circumstances have opened a narrow window to pass meaningful reform that protects the health of American families,” says Denison, who worked to improve the bill with senators in both parties, industry and other non-profit groups.

Some of those groups are withholding support in hopes of further strengthening the bill. “We understand their concerns and will continue to work with Senator Udall, the environmental community and others to get the strongest possible bill enacted into law,” says Dr. Sarah Vogel, EDF’s health program director. “It isn’t perfect but it is well worth supporting. Congress cannot afford to let this historic opportunity slip from its grasp. This is the best chance in a generation to provide strong protections for Americans.”

“Toxic chemicals take a serious toll on our health. We owe it to our children to pass the strongest possible law to ensure the safety of commonly used chemicals.”

—Dr. Sarah Vogel, EDF Health program director



JOHN FANE

The environment in the crosshairs

By Charlie Miller



America's bedrock environmental protections are under assault in the new Congress. We have the law and the weight of public opinion on our side, but here's what we are up against in what promises to be a challenging year.

Climate of obstruction

Senate Majority Leader Mitch McConnell says he feels a "deep responsibility" to stop President Obama's power plant regulations, and his top priority will be "to get the EPA reined in." The historic Clean Power Plan, which for the first time would limit carbon pollution from power plants, represents our most significant opportunity to curb climate change.

One line of attack will be to hobble EPA by slashing its funding and blocking its authority with riders on appropriations bills. The agency is already operating on one of its lowest budgets since the

1980s. A dozen coal-reliant states and coal giant Murray Energy are also challenging the EPA's authority in court, and we expect a barrage of investigations, hearings and oversight maneuvers and an attempt to use the Congressional Review Act to derail the standards. EDF will continue its staunch defense of the carbon emission rules to ensure that the final standards are strong.

We need Republicans and Democrats to work together to fight the devastating effects of climate change. Sen. Kelly Ayotte (R-NH) gets it. Rather than battling on climate, she says, Congress needs to "work together and come up with longer-term solutions."

Wildlife under attack

A provision that halts efforts to determine whether the greater sage grouse should be listed under the Endangered Species Act (ESA) was tucked into December's must-pass deal to fund the government. Grouse habitat overlaps with oil and gas drilling areas in the West. One month later, the lesser prairie chicken narrowly escaped being delisted through political maneuver. (Delisting is usually a rigorously scientific process.)

Weakening the ESA under the guise of reforming it has long been a rallying cry in the House. In the current Congress, we can expect to see a volley of bills that would make securing wildlife protections



Polluters' playbook

The new chairman of the Senate Environment and Public Works Committee, James Inhofe (R-OK), is poised to do serious damage to the battle against climate change. He's made it clear he intends to wield his gavel to defund, discredit and delay EPA action on climate and air. "I will do everything in my power to rein in and shed light on EPA's unchecked regulations," he says. Inhofe is the author of a book celebrating climate denial (*The Greatest Hoax*).

more expensive and arduous than ever. EDF has successfully defended the ESA before and we will continue to do so. We are also introducing programs to protect vulnerable species on working lands with or without a listing.

“Model” legislation

The American Legislative Exchange Council (ALEC), a lobbying group that brings together politicians and corporate interests to draw up “model” legislation, had only limited success in rolling back state renewable energy standards last year, and major corporate members like Google and Microsoft have severed ties. But ALEC remains a serious threat.

This spring, ALEC has a new set of anti-environment bills for legislators to take home. At its annual policy summit, ALEC unveiled some of its upcoming attack strategies, including draft bills that would expand offshore drilling, weaken clean air protections and disband EPA.

EDF was involved in the successful pushback against ALEC’s effort to undermine renewable energy standards in North Carolina, and will continue to help forward-thinking states implement

clean power plans, sweep away obsolete rules and encourage clean energy.

The war on mercury, Part II

EPA’s landmark Mercury and Air Toxics Standards will be challenged in a suit before the Supreme Court this spring. The standards, finalized in 2011, set the nation’s first emission limits on mercury, soot and other harmful pollutants from coal-fired power plants.

The rules, which were decades in the making, prevent an estimated 11,000 premature deaths every year and have withstood the scrutiny of lower courts. Despite the fact that the health-care benefits exceed costs by at least three to one, some in the fossil fuel industry have balked at the price tag for implementation. EDF will continue to do everything we can to defend these life-saving standards in and out of the courtroom.

»»» TAKE ACTION »»»

We need your help to fight Congressional attacks on strong climate standards and other bedrock environmental protections. Tell Congress to let EPA do its job, at edf.org/handsoffenvironment.



Clouds of migrating monarch butterflies have dazzled people for generations, but their numbers have plummeted and they need help. We’re making sure Congress doesn’t weaken protections for species.

The “Jedi Master” is on the case

JOHN PAE



Don’t mess with them: Sean Donahue and EDF general counsel Vickie Patton are on the front lines defending environmental law.

This past summer, *The National Law Journal* ran a story on the remarkable string of successes of one lawyer, Sean Donahue, before the U.S. Supreme Court. “Donahue may not be a household name as a Supreme Court practitioner,” the article read, “but in four Clean Air Act cases this term, Donahue was the counsel of record for environmental groups supporting the U.S. Environmental Protection Agency in wins against the energy industry.”

Among those wins was EPA v. EME Homer City Generation, in which the court upheld EPA’s power to regulate air pollution that crosses state lines. The ruling “may be EPA’s greatest win ever in the Supreme Court,” Richard Lazarus, a professor at Harvard Law School and a member of EDF’s Board of Trustees, told the *Law Journal*.

Donahue may only now be emerging as a star at the Supreme Court, but at EDF, he’s been one for a decade. In case after case, he has worked with EDF’s legal team and allies to protect and strengthen the nation’s environmental laws.

As a young lawyer, Donahue clerked for Ruth Bader Ginsburg and John Paul Stevens. Today, EDF’s general counsel Vickie Patton calls him the “Jedi Master” for his ability to discern the best legal strategy to follow in a case, and for how he melds disparate groups of attorneys into collaborative partnerships.

“In the Obama administration, EPA has developed the first generation of protections to reduce climate pollution, and Sean is a leader in defending those policies,” says Patton. “His brilliant work in litigation has shaped the law on the nation’s most important climate protections.”

Donahue and EDF are busier than ever these days. “Everybody’s doing 40 things at once,” he says, pointing to the slew of lawsuits that have been filed to torpedo EPA’s plan for regulating carbon emissions from power plants.

“This is a time when we can make real progress on climate but there’s also a tremendous risk of backsliding in the face of really intense opposition,” says Donahue. “I’m encouraged that people on our side are really pulling together.”

Protecting your local ecosystem from alien invaders

FIVE MILLION FERAL PIGS, descended from domestic hogs and imported wild boars and possessed of a boundless appetite for native plants and animals, run wild in 35 U.S. states, causing up to \$2.5 billion in damage every year. Tiny zebra mussels, native to Russia, have hitched rides in the ballast of transoceanic ships and become a major problem in the Great Lakes. In the American South, kudzu vines from Japan choke trees, telephone lines and entire houses. Nutria—giant South American rodents—eat their way through wetlands, driving out endangered species. And thanks to irresponsible exotic pet owners, giant pythons now make their home in the Everglades.

It sounds like science fiction, but invasive species—aided by our global transportation system—are a serious and growing issue. Invaders travel on the soles of shoes, in the wheel wells of planes and in soil brought in by plant nurseries. Kind of scary, isn't it?

Here are some simple steps you can take to help keep local ecosystems in balance. And, if you want to do more, sign up for volunteer action to help keep a bad situation from getting worse.

■ Don't plant problems

Kudzu vine, Japanese knotweed and marsh-invading purple loosestrife were once sold as ornamentals. Make sure the plants you buy are not invasive, and report any non-native infestations to your local county extension agent or land manager.

■ Don't spread problems

Avoid transporting firewood more than 10 miles. You could be spreading tree-killing diseases and pests. After hiking, clean or rinse off your shoes or boots. As the Minnesota Department of Natural Resources puts it, "Come clean, leave clean."



SHUTTERSTOCK

Unwelcome guests: Imported for their fur, nutria now run wild in Louisiana and other states. They are described as "marsh-destroying machines."

■ Avoid exotic pets

It can be tempting to buy cute, unusual animals like sugar gliders, kinkajous, serval cats and wallabies (especially when they're babies). But your purchase almost invariably supports an irresponsible breeding or trapping operation. And releasing these pets into the wild is not only cruel to the animal, it's also dangerous and illegal, says the ASPCA. "The animal can spread diseases to native species or kill native animals and free-roaming pets."

■ Volunteer for containment programs

It can be very satisfying to go hands-on in the war against non-native species, and there are plenty of opportunities to get involved in your own part of the country. For instance, volunteers paddle the

waterways in New York's Adirondack Park looking for invasive aquatic plants.

At the Moore Creek Preserve in Santa Cruz, CA, teams go after harmful French broom under the watchful eye of the local Land Trust. And the tech-minded are learning from the National Wildlife Refuge Service how to use hand-held computers and GPS units to track and analyze the damage done by invasives on protected land.

■ Invasive species on the menu

"If you can't beat 'em, eat 'em!" Kudzu vine, for example, makes a delicious jelly and can be baked into a quiche or brewed for tea. Lionfish (which damage East Coast reefs) have meat that is buttery and flaky. The giant tiger prawn, a danger in the Gulf of Mexico, is another gourmet treat. Bon appétit!

Invasive species dos and don'ts

Help preserve local species.

- A partial list of what not to plant: bit.ly/1CEuaeZ
- Why exotic pets are a bad idea: bit.ly/1zLtSyl
- Don't transport firewood: bit.ly/1vCIT6e
- Eat exotics: bit.ly/1L8PZac and bit.ly/1cqFEHr

Volunteer for a balanced environment:

- National Wildlife Refuge Association: bit.ly/1vCjOaj
- Adirondack Park: bit.ly/1vSTRZG
- National Invasive Species Council: on.doi.gov/18XMVPX
- Appalachian Trail Conservancy: bit.ly/1zLtnnG

Letters

Can agriculture be sustainable?

In “Agriculture: Conservation’s New Frontier” (Winter 2015 *Solutions*), there is no mention of GMO crops, insecticide use or glyphosate. How can we talk about sustainability of agriculture without including these unsustainable practices?

—Joseph Thompson

David Festa, head of EDF’s Ecosystem program responds:

Thank you for your comment, Joseph. You put your finger on the complexity and number of issues that are important to consider when working toward a more sustainable agricultural system. To the few you mentioned, you could add diet, population growth, distribution, food waste and more. There’s certainly no shortage of things to tackle, and many organizations are looking into different parts of the challenge.

For advocacy organizations like EDF, the difficulty lies in choosing which issue to work on. When we considered where we could get the most environmental bang for our resources, fertilizer rose to the top. The problem itself is substantial. But solving it can deliver huge benefits—cleaner drinking water, a more stable climate, healthier coastal habitat and improved quality of life in rural communities.

We’re already part of the way there. Our team has decades of experience working with farmer networks to increase adoption of nutrient-efficient practices. By going beyond farmers and engaging the rest of the grain supply chain, we can scale up these practices and make them the norm, which will dramatically increase the resilience of the natural systems that sustain us all.



Corn is the biggest source of excess fertilizer.

Faith and climate

I am a Dominican sister of Adrian, MI, and a member of EDF. First, let me congratulate you on your winter 2015 issue of *Solutions*, “Blueprint for Climate Stability.” It is a superb presentation.

Our congregation has been involved in study and action around climate change for years. The topic is so involved that learning will go on for decades! I would love to give each member of my group a copy of the issue. Hopefully, reading about your successes will inspire us to promote what you have accomplished and how you are moving forward—and to spread the hope you give us for saving our Earth, our planet and human life.

—Sister Noreen O’Connell, O.P.

We want to hear from you!

Email us at editor@edf.org. Letters may be edited for clarity and length.

MEMBER SPOTLIGHT

A mom and climate scientist shakes up Florida



For her work on climate change, Nicole Hammer (in red) was chosen to sit in the First Lady’s private box.

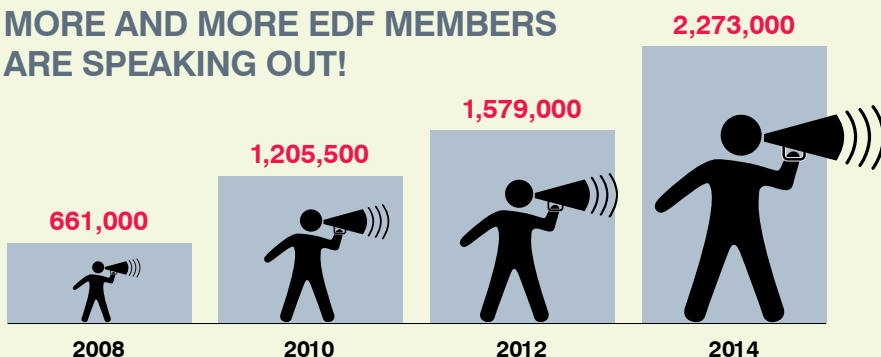
At January’s State of the Union speech, Nicole Hernandez Hammer was invited to sit in First Lady Michele Obama’s personal box. Hammer, a climate scientist and mother of a young boy, recently became manager of the Florida chapter of Moms Clean Air Force, a movement of more than 400,000 parents taking direct action against climate change that EDF helped catalyze.

Of Cuban heritage, Hammer was born in Guatemala and came to the United States when she was four. She later studied climate change and taught at the University of Southern Florida, where she became an expert on the impacts of rising seawater on freshwater reserves in the region.

Currently, Hammer is committed to rallying parents—especially those in the Latino community of south Florida—to fight climate change and do something about sea level rise that disproportionately affects lower income and immigrant communities in the region.

“I worked with my colleagues to confirm that our planet’s climate is changing,” says Hammer. “Now the debate is settled. Our seas are rising. In Miami, which is built on porous limestone, we’re already having problems with sewers and water systems. It’s time for action. I am working on behalf of my son. We need to fight climate change today.”

MORE AND MORE EDF MEMBERS ARE SPEAKING OUT!



EDF member emails to elected officials and political leaders have surged in recent years. Join other members in making your voice heard. Sign up at edf.org/how-you-can-help.



“In the rainforest, no niche lies unused. No emptiness goes unfilled. No gasp of sunlight goes untrapped. No other place on Earth feels so lush.”

—Diane Ackerman, author and naturalist