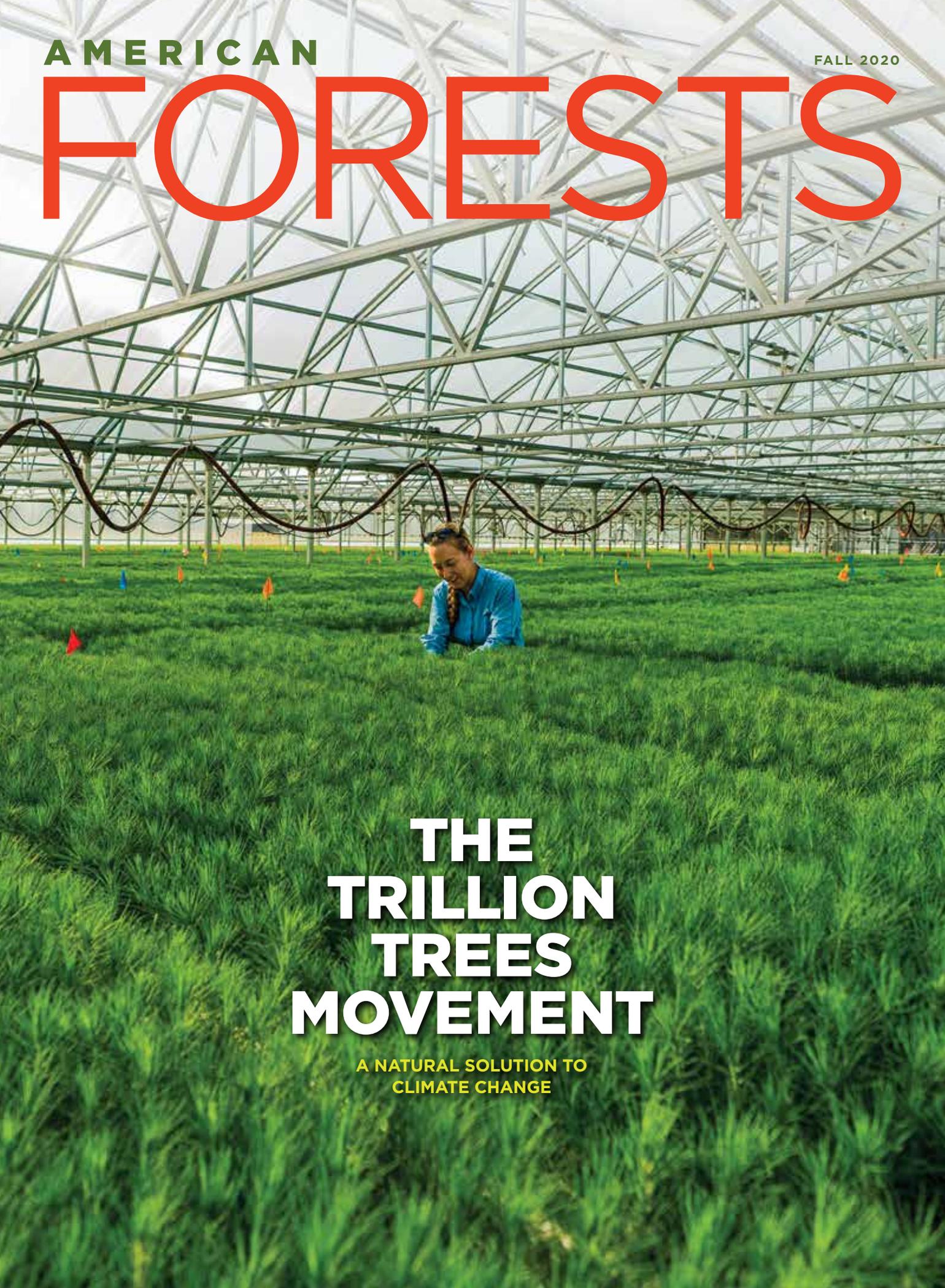


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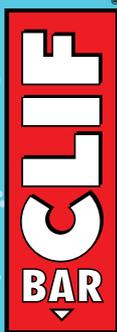
FALL 2020

FORESTS



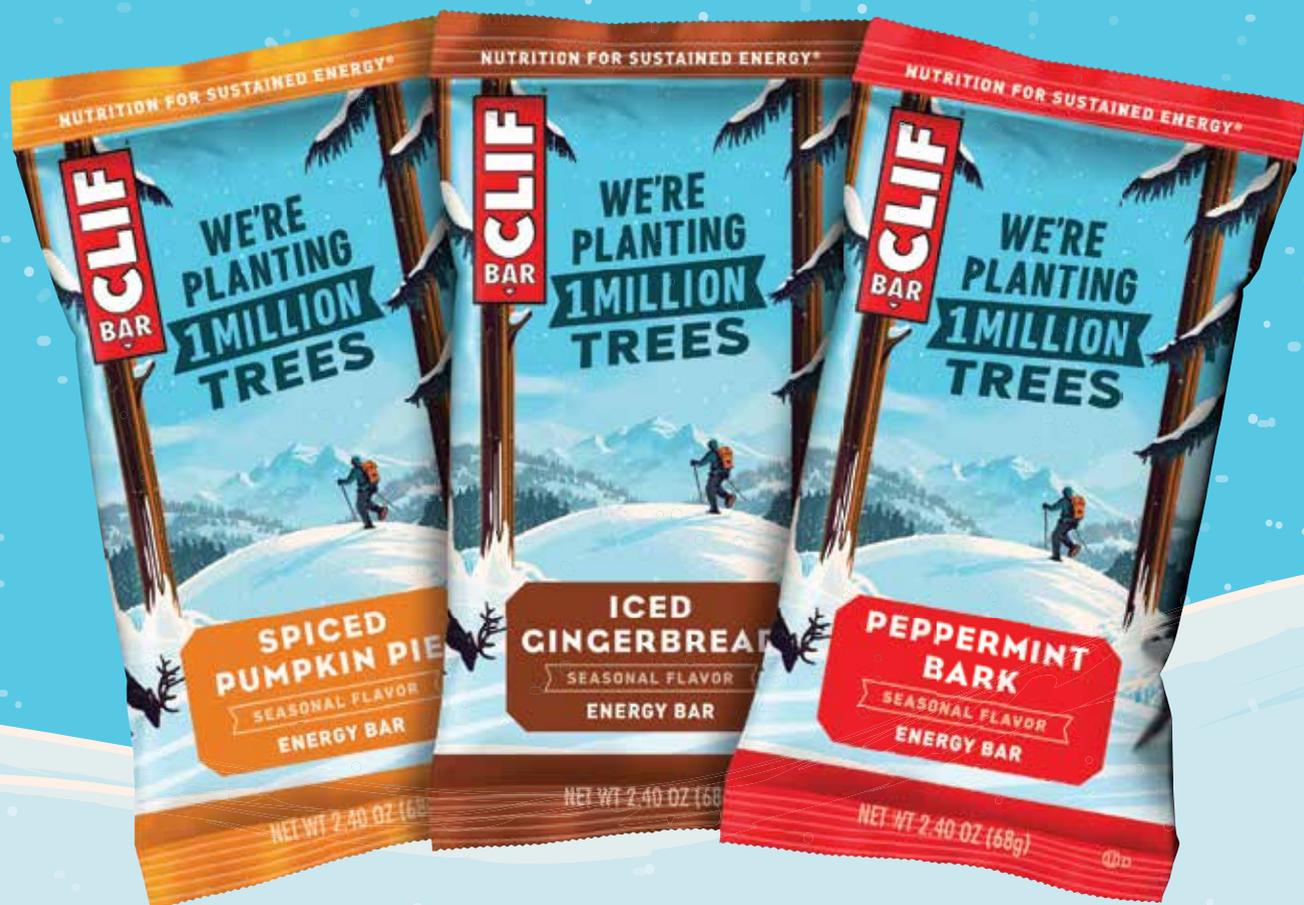
THE TRILLION TREES MOVEMENT

A NATURAL SOLUTION TO
CLIMATE CHANGE



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For over 15 years, Clif Bar & Company has partnered with American Forests, the oldest national forest conservation organization in the United States, to support tree planting and reforestation efforts. As part of our goal to plant one million trees by 2025, we're proud to contribute a portion of proceeds from seasonal CLIF BAR® flavors to support American Forests and their efforts to conserve and restore our forests.





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U.S. plants roots in global trillion trees movement

BY JAD DALEY

THIS ISSUE of the *American Forests* magazine coincides with a grand opening: the United States Chapter of 1t.org, a global movement to conserve, restore and grow 1 trillion trees by 2030.

American Forests and the World Economic Forum, which launched 1t.org in January, have come together to launch this chapter as the first of its kind. Other regional chapters are being considered.



So why is American Forests taking on yet another new challenge? Because it is time to bring together the most inclusive forest movement ever assembled in our country, from governments to Girl Scouts.

You have heard a lot from American Forests about our ambition to be a movement builder, rallying America behind our vision to reforest America by restoring damaged forest landscapes and

bringing Tree Equity to our cities.

Put simply, 1t.org gives us the power to do this better than we have ever dared to dream. The trillion trees vision is drawing in unprecedented new partners from well beyond the traditional forest community. This includes companies that have ambitions to go carbon neutral or negative, youth groups, churches and individuals rallying to the idea of planting trees and caring for our forests like never before.

No wonder, because we need trees like never before. Trees offer our most powerful natural solution to help slow climate change — potentially almost 30 percent of needed carbon reductions. But climate change-induced wildfires, droughts, pests and diseases are more prevalent than ever and compromise our forests' ability to sequester and store carbon. We must



Cities such as Boston, pictured here, are making new urban forestry commitments.



The U.S. needs healthy and resilient forests more than ever, given that they are the best nature-based solution to combat climate change.

take action to help our forests survive climate change, so they can help us solve the problem.

In American cities, people have sweated through a dangerously hot summer when they could not safely go to crowded parks or indoor spaces to cool off, due to COVID-19. Lower income people living without air conditioning have been especially at risk. This situation has underscored the life or death urgency in bringing the cooling benefits of trees to every neighborhood, which is our vision for Tree Equity.

We need a surge of forest conservation, restoration and tree planting comparable to a century ago, when American Forests was building the forest movement. In the 1930s, American Forests helped create the Civilian Conservation Corps, employing more than 3 million young people who planted millions of trees, fought wildfires and improved wildlife habitats. We can put America back to work again planting and caring for trees.

That's where the new U.S. Chapter of 1t.org comes in. Our belief is that the way we plant a trillion trees is one tree at a time. No contribution is too small. So we are going to use the U.S. Chapter of 1t.org to help anyone and everyone who is interested to find their place in this work. For the first time in decades, we have a community made up of the full diversity of partners who care about forests.

So how will the chapter make the whole of this movement more than the sum of its parts?

► **We invite any company, non-profit organization or government to make a pledge of action**, which will challenge everyone to do more and raise awareness. You can check the latest

pledges and total actions committed on our new website www.us.1t.org.

► **We offer a powerful community of practice** for trillion trees partners to learn, share and innovate. This will include cutting-edge forestry tools and resources shared on our website, online trainings and eventual in-person workshops, which we call Learning Labs.

► **We will help individuals find a role**, such as providing support to nonprofits leading this work and learning how to plant trees at home.

Our approach is already working. **Twenty-eight** U.S.-based governments, companies and nonprofit organizations that are part of the chapter have collectively pledged to plant or prevent the loss of **nearly 850 million trees**, in cities and large forest landscapes here in the U.S. and abroad. And this is just the very beginning.

There are few moments in history when America has faced so many colliding issues at one time. This perfect storm includes COVID-19, climate change, reckoning on racial equity and worsening risks to forests and other natural resources. The 1t.org U.S. Chapter will help our country meet this moment. Our leadership partner, the World Economic Forum, brings a wealth of global relationships, skilled people and technical resources to help us lead like never before. Onward to a trillion! 🌱

For more news and updates from Jad, follow him on Twitter @JadDaley



AMERICAN FORESTS

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American Forests' mission is to restore threatened forest ecosystems and inspire people to value and protect urban and wildland forests.

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INNOVATION

American Forests launches Tree Equity Score tool to help cities expand tree cover

Each Tree Equity Score for urban neighborhoods is based on the existing tree cover and tree cover potential, climate projections, development density, income, employment and race.

AMERICAN FORESTS has been talking about Tree Equity for a few years. In fact, we coined the phrase. Simply put, Tree Equity is about ensuring every city neighborhood has enough trees so that every person benefits from them. In most cities, trees are sparse in low-income neighborhoods and some neighborhoods of color.

American Forests now has a tool for determining the Tree Equity Score for urban neighborhoods. Each score

is based on the existing tree cover and tree cover potential, climate projections, development density, income, employment and race. American Forests' goal is that, in 100 of America's cities, every neighborhood will achieve a passing Tree Equity Score by 2030.

This fall and winter, scores for all neighborhoods in Phoenix, Rhode Island, the San Francisco Bay Area, Miami, Seattle and Houston will be finalized. American Forests plans to determine the scores for all city neighborhoods within the coming years. Tree Equity Scores could be calculated for up to 150,000 city neighborhoods, where 70% of people in the U.S. live.

City government employees, community activists, urban foresters and others will be able to use the scores to make the case for planting trees in the neighborhoods that need them the most, and allocating the resources needed to do so.

They then can use the new Climate and Health Action Guide to help inform their strategy for improving the scores. Tactics may pertain to maintaining or increasing the extent of urban forests, reducing the impact of extreme heat and other biological stressors, and lowering the risk of tree damage. The guide, written by American Forests and the U.S. Forest Service's Northern Institute of Applied Climate Science, will be finalized this fall.

Also this fall, American Forests will launch [TreeEquityScore.com](https://www.treeequityscore.com), a website where anyone can access the completed Tree Equity Scores. Visi-



tors also will be able to enter details about a planned tree planting project and then find out how much that project would increase a Tree Equity Score. This website also is where the action guide will be available, either to read online or download.

A companion piece to this new tool will be the Impact Certification Score being developed by City Forest Credits and Dr. Kathleen Wolf, a social scientist who researches perceptions of nature in cities. This particular score will be based on the environmental, human health and equity impacts of tree planting projects. Cities rarely report on the impacts associated with their tree planting projects, other than the number of trees planted and volunteer hours contributed.

Climate change and public health are the two reasons American Forests

was driven to create the Tree Equity Score tool, which was done in partnership with the University of Vermont. Trees help protect people from heat (which is more intense now, due to climate change) by lowering temperatures and counteracting the urban heat island effect, in which roads, rooftops and other darkly-colored surfaces absorb heat and make their surroundings warmer. This is significant, given that a 10-fold increase in heat-related deaths is expected in the eastern U.S. by 2050.

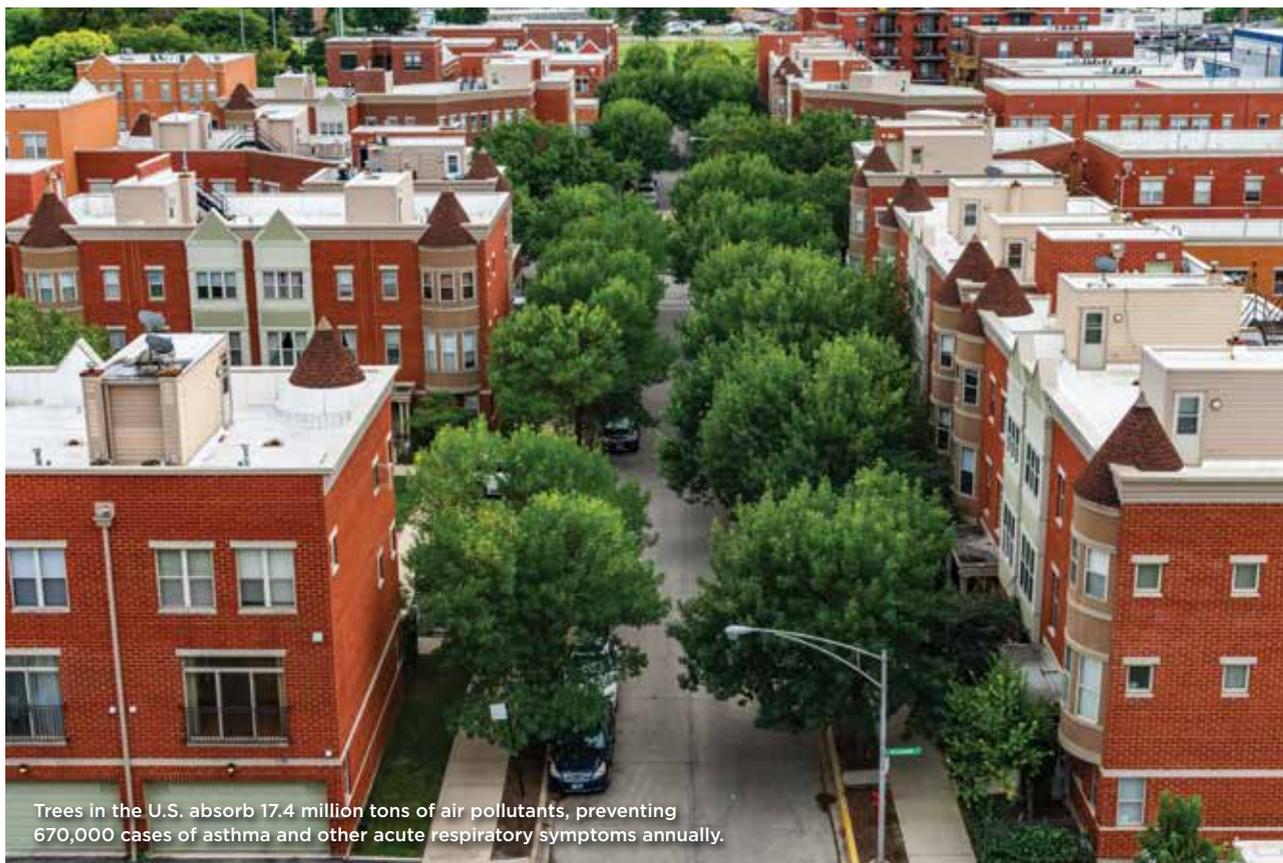
Climate change also means more harmful gases in the air. City trees

can improve air quality by trapping air pollutants, which keeps the air clean, limits the formation of ground level ozone, and reduces cardiovascular and lower respiratory tract illnesses. Trees in U.S. metropolitan areas and

American Forests' goal is that, in 100 of America's cities, every neighborhood will achieve a passing Tree Equity Score by 2030.

small towns absorb 822,000 metric tons of air pollutants, preventing 575,000 cases of acute respiratory symptoms annually.

American Forests looks forward to helping you determine your scores and create Tree Equity in your city. 🌿



Trees in the U.S. absorb 17.4 million tons of air pollutants, preventing 670,000 cases of asthma and other acute respiratory symptoms annually.



PLACE-BASED PARTNERSHIPS

La Sal del Rey planting prepares rare Texas thornforests for an uncertain future

VARIETY MIGHT BE the spice of life. But salt is a close second.

Blindingly white under the South Texas sun, the salt flats of La Sal del Rey have long whetted appetites. Early indigenous groups camped on the lake's shores, where they likely used the salt to preserve game. They were followed by the Aztecs, and later by Spanish colonizers, who both claimed the lake's lucrative salt deposits for their king.

The lake's salt mining days are over. Its surroundings are now known for another rare commodity: native thornforests, also called tamaulipan thornscrub. Thornforests host more than 530

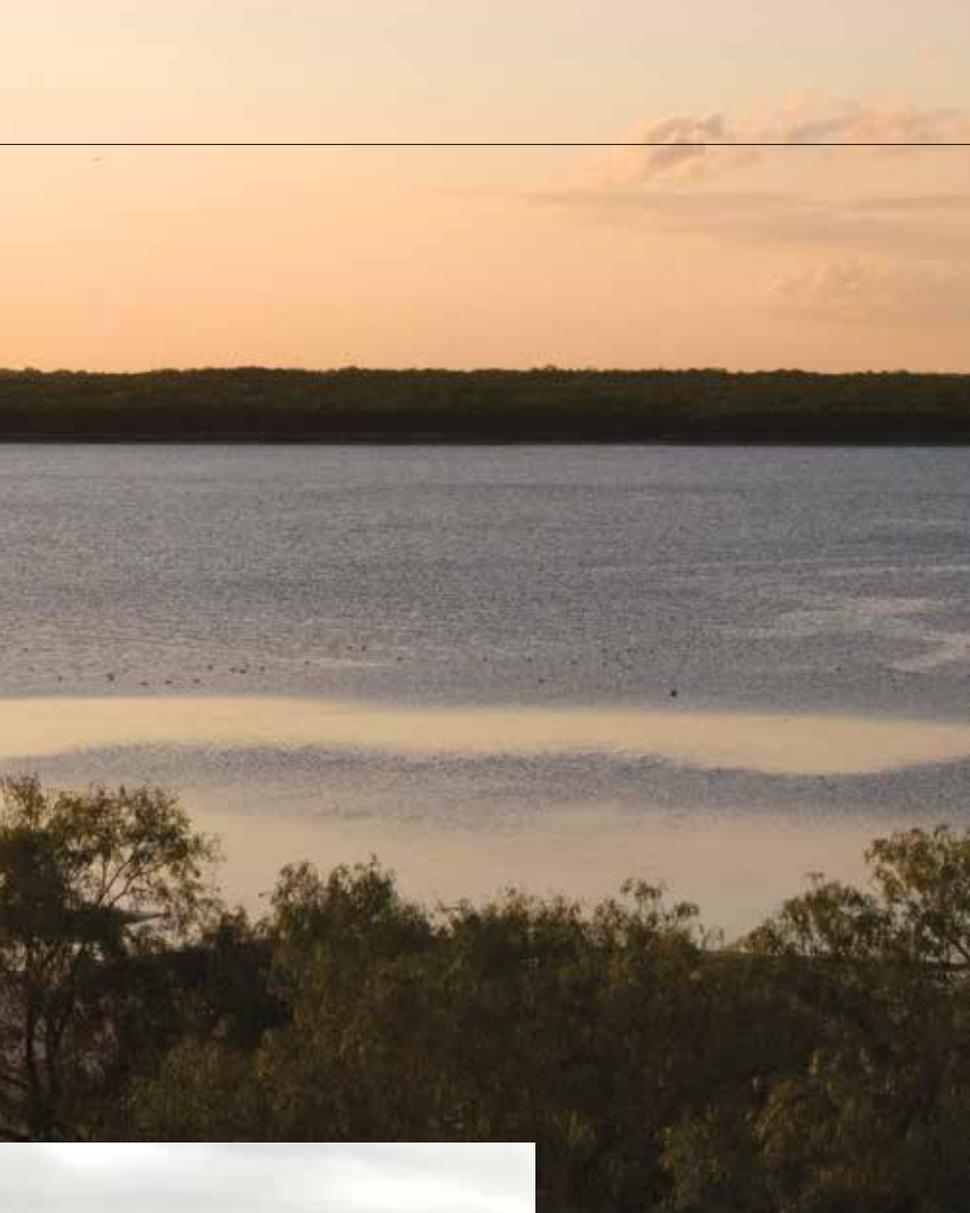
bird species and are the only habitat in the United States for the ocelot, a rare, leopard-spotted cat. These forests once blanketed the Lower Rio Grande Valley, but are now restricted to less than 10% of their former range. As climate change and fast-growing suburban sprawl take their toll, the future of these landscapes hangs in the balance.

In March, as part of a multi-decade push to restore these dwindling forests, American Forests planted 70,000 thornforest seedlings near the southern shore of La Sal del Rey. The planting project, carried out in partnership with the U.S. Fish and Wildlife

Service and with support from the Wildlife Conservation Society's Climate Adaptation Fund, reforested 70 acres of abandoned farmland in the Lower Rio Grande Valley National Wildlife Refuge.

Crews used heavy equipment to clear stubborn invasive grasses, then planted seedlings in plastic "shelter tubes" that can boost plant survival rates by as much as 90%. The tubes help stop hot winds from drying out the seedlings and encourage the young plants to grow tall and put down deep roots.

"It looked almost like a construction site," said Jon Dale, American



Left: La Sal del Rey sits atop an estimated 4 million tons of salt and is seven times saltier than the ocean.

Below: In March, American Forests planted 70,000 thornforest seedlings near the southern shore of La Sal del Rey, using plastic “shelter tubes” that can boost plant survival rates by as much as 90%.

goes, the more likely the overall forest is to thrive.

This planting will also inform the rollout of the newly completed Thornforest Conservation Plan, the first region-wide assessment of strategic thornforest reforestation opportunities. American Forests initiated the development of this plan in 2018, and is currently crafting a business plan with local partners to define the specific objectives and strategies to fund and prioritize additional planting efforts in the Lower Rio Grande Valley.

Diverse plantings, like the one at La Sal del Rey, don't just restore habitat for ocelots and other wildlife. They also help carry on the region's millennia-old history of people and plants. A vast array of thornforest species have medicinal and culinary uses, explained ethno-

botanist Benito Trevino, an expert in the propagation and uses of the region's plants. The seed pods of Texas ebony — one of the species planted at La Sal del Rey — can be eaten raw, he said, or grilled for a “really nice toasty flavor.” Roasted and ground up, the pod becomes a coffee substitute.

The region's ubiquitous mesquite and prickly pear cactus will soon colonize the planting site as well. The prickly pear's roots are medicinal and its paddles are edible, Trevino said, while its fruit is not only tasty but also a remedy for diabetes. As for mesquite, its sweet pods can be ground into flour, which Trevino's wife adds to cupcakes and waffles.

It's only appropriate that so many edible plants will soon grow on the shores of La Sal del Rey. As a good chef knows, any flavor can be boosted with a pinch of salt. 🌱



As climate change and fast-growing suburban sprawl take their toll, the future of these landscapes hangs in the balance.

Forests' senior manager for forest restoration in the region. “Except we were rebuilding habitat, not structures.”

This was the first project done in accordance with a new drought resilience strategy developed by American Forests and the U.S. Fish and Wildlife Service, which aims to grow thornforests that can withstand the hotter, drier future forecasted for Texas. As part of this strategy, the La Sal del Rey planting used 31 native tree and shrub species, grown from seeds collected from a variety of individual plant populations across the valley — the more diverse the genetics, the thinking

MOVEMENT BUILDING

Global coalition strives to put forests at the forefront of climate solutions

“NATURE-BASED Solutions to Climate Change.” It’s a phrase that began to take hold around the world five years ago.

It’s no wonder, given that forests, wetlands and grasslands absorb and then store large amounts of emissions from harmful greenhouse gases. They do this so well that scientists say nature can account for more than one-third of the global reduction in carbon emissions that is needed by 2030.

That number is so powerful that a global coalition called Nature4Climate was started in 2017. Its members are on a mission to ensure that natural climate solutions — such as planting trees and sustainably managing forests — are

prioritized for public policy and private investment. Nature4Climate is also intended to provide a drumbeat of compelling and informative communications that assure natural climate solutions are not overlooked by the powerful actors who make these decisions.

The United States is home to the first national chapter of the coalition, in part because of the potential influence decision-makers in the country have over the use of natural resources in the U.S. and overseas — because of the country’s purchasing power, for example. American Forests is one of nine entities leading the group. Natural climate solutions also are at the core of the U.S. Chapter of It.org, the global tril-

lion trees platform. American Forests and World Economic Forum co-lead that chapter, which launched in August.

“The power of forests and other natural climate solutions has been hiding in plain sight,” says American Forests President and CEO Jad Daley. “We need to lift up this opportunity so that nature is treated as a core climate strategy.”

The initial focus of the U.S. chapter of Nature4Climate is building a movement of people who support federal policies that incorporate natural climate solutions. Such policies are particularly appealing now, as we work to rebuild the economy, because of the number of jobs that natural areas support. For example, working forests in the U.S. support more than 2.4 million jobs, according to a new Nature4Climate report called Nature Positive Recovery, including 120,000 jobs in forest restoration alone. If Nature4Climate is successful, new public and private investment in forest restoration will lead to strong increases in natural climate solutions and green jobs alike. 🌱



Forests, and other natural solutions, can account for more than one-third of the global reduction in carbon emissions that is needed by 2030.



Left: Sheryl Gold in her East Hampton, N.Y., backyard. Gold has been an advocate for urban forests for 30 years.
Below: Gold with actor Christopher Reeve in 1990 on location in Sarasota, Fla., filming Discovery Channel/Global ReLeaf public service announcements, which included a dedicated 900 call-in number to plant a tree.

promoted the goal of planting millions of trees in the U.S.

“It inspired me to become an urban citizen forester,” says Gold, who now splits her time between Coral Gables, Fla., and another barrier island — Long Island, N.Y.

Gold spent the next 25 years concentrating on forestry issues closer to home. She co-founded and led an advocacy group to protect Miami Beach’s mature native trees, which

provide vital shade in an ever-hotter climate, and pushed the city to hire its first forester.

Lately, she’s been considering her legacy. Her thoughts have returned to American Forests, specifically the equity and diversity focus of its Tree Equity: Career Pathways Initiative, which creates opportunities for people from under-resourced communities to get training and find work in urban forestry.



DONOR PROFILE

Advocate inspires with decades-long support of forests

TO A YOUNG GIRL, it was paradise. Sheryl Gold’s modest Miami Beach apartment opened onto a world of wonders: the powerful yet soothing ocean, sand for miles, exotic-looking birds and tangles of shady banyan trees and mangroves.

“We didn’t ever leave the island when I was a child,” recalls Gold, now 74, of growing up on Miami Beach. “You didn’t go into downtown Miami. You just felt closer to nature.”

Over time, Gold’s connection to the natural surroundings of her barrier island home gave way to worries about

rising sea levels and development, and ultimately spurred a lifelong passion for the environment. But it was her introduction to American Forests that sparked her laser focus on trees and her decades of volunteer work.

Intrigued by the role trees play in cooling the earth, Gold, then a marketing executive in New York City, created a national television public awareness campaign in 1990 for American Forests’ new Global ReLeaf program (now called American ReLeaf). The campaign featured actor Christopher Reeve and

“It inspired me to become an urban citizen forester.”

— SHERYL GOLD, FOREST ADVOCATE

“American Forests is constantly seeking out new solutions to challenges and finding innovative ways to address them,” says Gold, who recently made a bequest to American Forests. “I found this to be exactly the kind of action that spoke to me.” 🌱

YOUTH PROFILE

Southern roots lead to career in urban forestry

WHILE PERCHED atop a tractor, with his father by his side, Joshua Simon became a lover of the land beneath him.

Planting pecan trees on his family's farm in Morganza, La., was one of the things he enjoyed doing the most when he was a pre-teen. Not only did

the trees provide nuts for pecan pie, a quintessential Southern staple, but, once grown, they provided much-needed shade from the blazing hot sun.

No one was surprised, therefore, that Simon planned on studying agriculture in college. But when a stranger suggested he focus on trees,

and specifically in cities, Simon was intrigued. He decided to pursue a degree in urban forestry at nearby Southern University and A&M College.

While there, he read "Dumping in Dixie" by Dr. Robert Bullard, which chronicles the disproportionate health impact of petrochemical plants on Black Americans in the South. Simon realized that decisions about where to locate everything, from industry to trees, can have long-term ramifications for people's health.

Trees can improve health by cleaning the air people breathe and reducing stress. But a map of tree cover in cities is too often a map of income and race. Often in cities, trees are sparse in low-income neighborhoods and some neighborhoods of color.

Now a master's student at Ohio State University, Simon is researching how social and economic class status may influence who has access to green space. As part of his work, he is studying patterns among Black, White and East African immigrant populations in Columbus, Ohio, home to the university. Surveys from three census tracts reveal all populations visit parks but at different rates. People with higher incomes use parks more frequently and often have access to higher quality parks in and outside of their neighborhood.

"There's little research about the socioeconomic dimensions that affect green space access and use in Columbus," says Simon. "I want to make sure Black and Brown communities have equitable access to the benefits of trees."

Simon believes understanding how various populations want to use and access parks can help cities make better decisions about where more trees and parks are needed — whether they're mighty oaks in a busy city or pecan trees in a tiny town. 🌿

Joshua Simon is a master's student studying environmental social science at the School of Environment and Natural Resources at Ohio State University.



COURTESY OF JOSHUA SIMON

ACTION CENTER

How to choose the right tree for your yard

PLANTING A TREE on your property can be beneficial to you and your community. Trees lower your utility bills by shading your house in the summer and blocking wind in the winter. They clean the air and reduce flood risks. Trees help fight climate change, and they're even linked to improving mental health.

Follow these four tips to maximize the benefits a tree provides. We call this "right tree, right place."

1. Location. Choose the right planting spot, at least 15 feet from buildings so roots and branches can have room to grow and don't invade surrounding infra-

structure, such as power lines, sidewalks and pipes. Dial 811 to notify your utility company of your intent to dig so they can locate and mark underground utilities.

2. Function. Consider what you'd like your tree to do. Would you like a shade tree, a flowering tree, one that will attract wildlife or something else?

3. Tolerance. Think locally and research what kind of trees thrive in your region. Use available resources, like the Audubon Native Plant Database, to look up trees that are native to your area. The United States Department of Agriculture's Plant Hardiness Zone Tool will tell you your local planting zone. But, keep in mind that climate change is quickly altering these zones. Because of this, you may want to choose a tree species that can tolerate higher heat or more



intense droughts. A local arborist may be able to give you advice.

4. Selection. Trees have specific requirements for sunlight, soil and water. Choose a tree that will thrive in the location you've selected. A tree that needs full-sun exposure may not survive if planted in shade, and a tree that thrives in dry soil might die if planted in poorly drained soil. 🌱

For more information on choosing and planting the right tree, visit [americanforests.org/how-to-plant-a-tree](https://www.americanforests.org/how-to-plant-a-tree).

A large photograph showing a group of people, mostly wearing green t-shirts and hats, engaged in a tree-planting activity in a wooded area. The scene is bright and sunny. Overlaid on the image is the text "BE PART OF THE SOLUTION" in large, bold letters. At the bottom, there is a call to action to become a member and the American Forests logo.

BE PART OF THE SOLUTION

Make a difference for forests and the world. Become a member today!
www.americanforests.org/ways-to-give/membership

 AMERICAN FORESTS

WASHINGTON OUTLOOK

Two legislative wins on Capitol Hill for national forests

THERE ARE 154 national forests in the United States. If you haven't had the pleasure of hiking in one of them, you might've drunk a glass of water that originated in a river that flows through this type of forest.

Despite the beauty and importance of national forests, they are being degraded and destroyed by development and climate change-induced droughts, diseases, uncontrolled wildfires and more.

Two big wins happened in Washington, D.C., this summer to help make these forests healthy again. Both moves show the kind of leadership needed for the U.S. to contribute to reaching the global trillion trees goal being led by 1t.org.

The Great American Outdoors Act was signed into law in August, marking one of the greatest forest conservation

achievements in decades. The legislation fully and permanently funds the Land and Water Conservation Fund (LWCF), the nation's most important tool for providing access to national forests and other public land. American Forests and its partners have been advocating for this legislation since the fund was created in 1965.

The law doubles, to \$900 million annually, the money allocated to LWCF. Governments will be able to use the money to maintain forests and expand the amount of protected forests, both on private and public land. Most of this land will be open to the public. The increase will also support the Forest

Legacy Program, the only federal program for protecting privately-owned forests through conservation easements or land purchases.

A complement to this legislation, The REPLANT Act, was introduced in the House and Senate in July. It focuses on conserving the national forests we have, largely by planting trees.

Both pieces of legislation could help boost our economy. Every \$1 million invested in LWCF could support up to

Never have the American people valued their parks, trails, forests and waterways more.

31 jobs. And every decade, through The REPLANT Act, 49,000 new jobs would be created to reforest 1.2 billion trees.

Both, too, are good for our health. Never have the American people valued their parks, trails, forests and waterways more, turning to them during COVID-19 for emotional solace and physical activity. 🌱



The 154 U.S. national forests cover a combined 188 million acres. This summer, the Great American Outdoors Act was signed into law, fully and permanently funding the Land and Water Conservation Fund, the nation's most important tool for providing access to national forests and other public land.

GLACIENPS VIA FLICKR



A CCC crew battles the Big Pine Creek Fire in Angeles National Forest in California in May of 1934.

HISTORY

Forestry plays important historical role in combating unemployment

PUTTING MULTITUDES of unemployed people to work planting trees and taking care of our natural resources during an economic crisis is not a new strategy for the United States or American Forests.

The Civilian Conservation Corps (CCC), launched in 1933 under President Franklin Delano Roosevelt, was the largest jobs program for young people ever seen in this country. More than 3 million men took part in the program, planting millions of trees, putting out forest fires, improving wildlife habitat and building roads and trails.

American Forests played a pivotal role in creating the CCC. Ovid Butler, then executive secretary of the American Forestry Association (now American Forests), advocated for a national program that would provide forestry jobs to hundreds of thousands of people.

States had already begun turning to the forest sector to help fill the unprecedented unemployment gap. Most notable was California, which

had established 28 forestry camps, where 3,000 men from cities worked in exchange for lodging and meals.

In the summer of 1932, when thousands of veterans set up an encampment in Washington, D.C., and demanded bonus payments for serving in World War I, Butler spearheaded an effort to establish a federal forestry work program that would employ up to 130,000 veterans. But Secretary of Agriculture Arthur Hyde rejected it.

Shortly after, Roosevelt, the Democratic nominee for president, proposed a massive forestry conservation workforce and wrote to Butler directly: "... on the subject of employment of emergency funds on forestry projects ... I wish to commend this effort you are making and to express my personal appreciation of it."

After the election, Roosevelt created the CCC

to provide work, largely for young, unmarried men. American Forests was given the pen the president used to sign the bill into law.

Nearly 90 years later, the CCC's legacy garners praise and criticism. For example, most of its camps were segregated, and in parts of the South, local directors excluded Black men from the corps. But many of the lessons from its nine-year run are relevant to a modern-day CCC that could be part of the COVID-19 economic recovery effort. 🌱



A CCC crew member plants Ponderosa pine on cut-over and slash-burned lands in Lolo National Forest in Montana in May of 1938.

What Is a Forest Carbon Sink?

The elements of a forest — the trees, soil, roots and decaying matter — can all absorb and store carbon, as well as release it.

A forest is considered to be a carbon sink if it **sequesters (a.k.a. absorbs) more carbon from the atmosphere than it releases.** The size of any forest carbon sink is determined by the amount of carbon absorbed minus the amount of carbon released.

We can ensure a strong net gain in carbon absorbed — a much-needed solution to addressing climate change — if we manage forests in such a way that existing healthy trees can grow, and if we plant more trees, always being sure they are the right trees, chosen for the right places.

∨ Carbon Sequestration and Storage

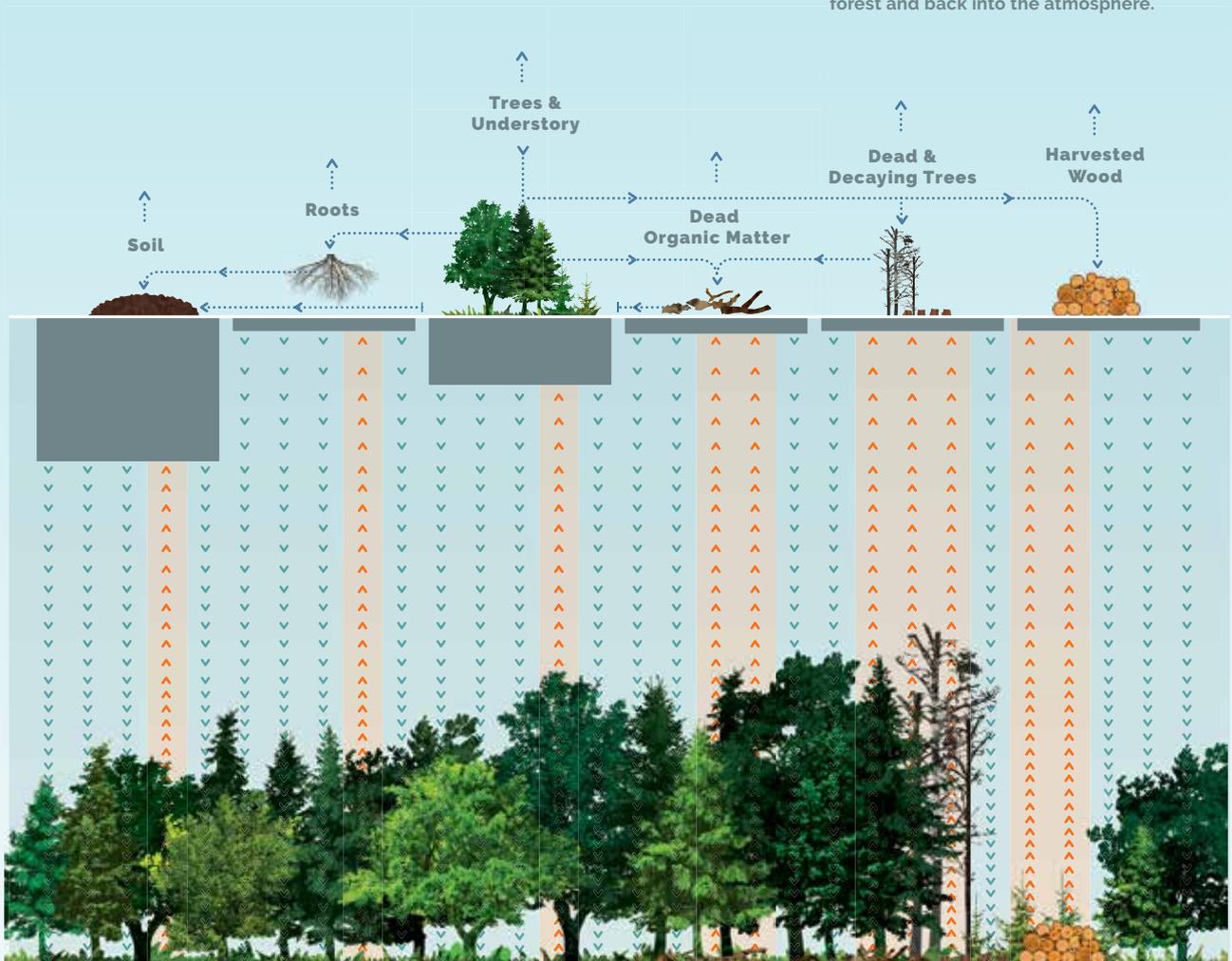
∧ Carbon Release

Tree leaves absorb (or sequester) carbon from the atmosphere through photosynthesis. Some of the carbon is stored in the tree leaves, trunks, branches and roots, and some is transferred into the soil.

All elements of a forest release some carbon through natural decomposition, but much more carbon is released when trees are destroyed, such as during wildfires. Some carbon is also released when land is cleared to build homes or create farms, but most of the carbon in those trees is transferred into useful harvested wood products.

Carbon Flow

Carbon can also be transferred — or flow — from trees into different elements of the forest and back into the atmosphere.



Forest Carbon Stocks

In forests, carbon is stored in various “pools” — live trees, standing dead trees, downed wood, the forest understory and soils. Carbon stored by the pools in a forest make up its “carbon stocks.” The amount varies by the type of pool — for example, soil and live trees have the biggest carbon stocks. Soil stores over half the carbon in the forest all by itself!

The Benefits of Sustainable Harvesting

As trees get old or sick, they grow more slowly and sequester less carbon — and when they die and begin to decay, they start to release more carbon than they sequester. When these trees are harvested, most of their carbon is transferred to useful wood products, while making space for the next generation of trees to grow and sequester more carbon.

MOTIVATIONAL MUSINGS

“Nature simply cannot afford for us to waste any more time. None of this will be easy, system change at this scale never is.”

JENNIFER MORRIS, CHIEF EXECUTIVE OFFICER OF THE NATURE CONSERVANCY, *THE GUARDIAN*



Dr. Tanisha M. Williams
@T_Marie_Wms

“During #BlackBotanistsWeek a reporter asked me what can we learn from plants. I looked out my window at the Norway Maple and I said, ‘resilience.’ We can learn a lot from plants.”

TANISHA WILLIAMS, LEWISBURG, PA. RESIDENT, *TWITTER*

“Racial inequities have many causes and thus many solutions. Changes are needed, for example, in schools, housing, and police. In Minneapolis, residents are showing an additional route to racial equity – in the shared love and respect of their trees and gardens.”

THE CHRISTIAN SCIENCE MONITOR EDITORIAL BOARD, “A PROTEST AGAINST ONE RACIAL INEQUITY – TREE DESERTS,” *THE CHRISTIAN SCIENCE MONITOR*



Sacha Spector
@SachaSpector

“The biggest moral hazard is in leaving future generations with an uninhabitable planet, not bailing out energy companies. Just take them out of the equation.”

SACHA SPECTOR, FOREST ADVOCATE, *TWITTER*

“Our changing world is testing the resiliency of our urban forests more and more... Community tree planting is a proactive defense and will remain a key strategy for communities to fight these pressures.”

MICHAEL BRUNK, URBAN AND COMMUNITY FORESTRY ADMINISTRATOR FOR ILLINOIS DEPARTMENT OF NATURAL RESOURCES, *RIVERBENDER.COM*

“There will be no jobs or prosperity on a dead planet.”

ALAN JOPE, CHIEF EXECUTIVE OFFICER OF UNILEVER, *THE GUARDIAN*

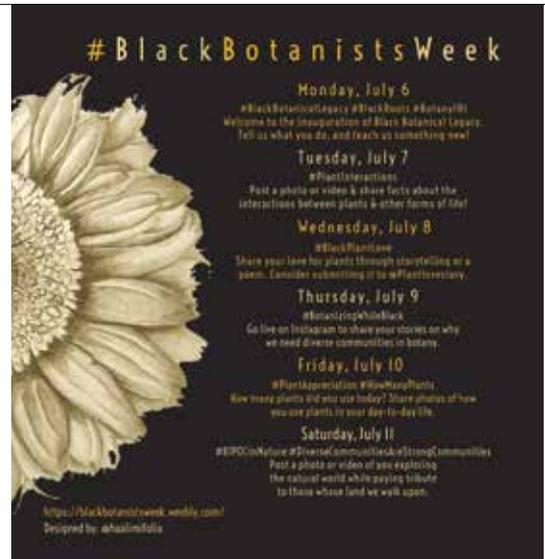
“When white people see me out in nature, it’s like they see me as an outlier or a surprise instead of thinking I belong there just like them. So we want to provide visibility and representation to black people to say, ‘You are not actually alone.’”

CORINA NEWSOME, CO-ORGANIZER OF #BLACKBIRDERSWEEK AND GRADUATE STUDENT AT GEORGIA SOUTHERN UNIVERSITY, *GRIST*

FOREST FOOTNOTES

#BlackBotanistsWeek — celebrating black people who love plants

Black, Indigenous and people of color (BIPOC) who love plants celebrated that passion this summer during #BlackBotanistsWeek, a social media campaign that encouraged all BIPOC plant lovers to spend one week posting about flora. This followed several viral campaigns supporting Black environmentalists, including #BlackBirdersWeek, which followed an incident in New York City’s Central Park in which a White woman called police on a Black man who was birdwatching. #BlackBotanistsWeek helped promote, encourage and create a safe space for BIPOC to connect and share information. Some shared photos of plants that reminded them of special moments with their families. Others posted poems about what they appreciate about plants. On the last day of the week, many honored the knowledge of indigenous communities who historically walked the lands we appreciate today. “This week helped us find each other,” says Dr. Tanisha Williams, one of the founders of the campaign, which engaged 3,000 people on social media. “Next, we want to create an online networking platform to support the people we reached on social media and create a fund to provide young botanists with field supplies.”



#BlackBotanistsWeek, a social media campaign, helped promote, encourage and create a safe space for BIPOC to connect and share information.

Groundbreaking study rules out best-case climate change scenarios

Scientists have tried for decades to pin down how much the planet will warm if human activity doubles atmospheric carbon dioxide concentrations, a level we’re on track to hit within about half a century. A major new study, released in July in *Reviews of Geophysics*, has narrowed the likely range of warming to between 4.1 and 8.1 degrees Fahrenheit. This finding, the result of four years of research, rules out prior best-case climate predictions. The low end of the range, 4.1 degrees, is past the 3.6-degree “safe” threshold for planetary heating. Beyond this the world will see increasingly dire famines and droughts, temperatures rising beyond human survivability and other planet-altering catastrophes. Atmospheric carbon dioxide levels are currently at around 413 parts per million, compared to the pre-industrial levels of 280 parts per million. Unless the world makes immediate and deep cuts in fossil fuel emissions, and couples that with reforestation and other actions, we are on track to see carbon dioxide levels double from pre-industrial concentrations within the next 50 years or so.

Unless the world makes immediate and deep cuts in fossil fuel emissions, and couples that with reforestation and other actions, we are on track to see carbon dioxide levels double from pre-industrial concentrations within roughly 50 years.

ABOVE: BLACK BOTANISTS WEEK; BELOW: JUSTIN MEISSEN VIA FLICKR

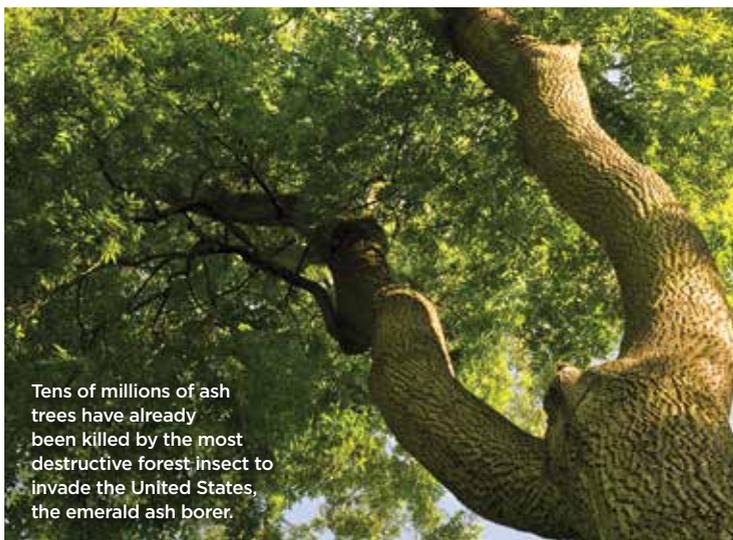


More than half of the world's people reside in cities, so green actions taken by cities can have significant impacts on large numbers of people and wildlife.

C40 Cities launches agenda for a green and just recovery from the COVID-19 pandemic

A coalition of cities from around the world has developed a COVID-19 economic recovery plan that calls for creating green jobs and improving public green spaces to benefit human health and nature. C40 Cities, a network of 96 cities that formed to take bold action on climate in accordance with the Paris Agreement, recently outlined a vision for an equitable and sustainable recovery in its “C40 Mayors Agenda for a Green and Just Recovery.” More than half of the world’s people reside in cities, so the actions taken by cities can have significant impacts on large numbers of people and wildlife. Although the recovery agenda is led by mayors, its members are also calling on national and regional governments to join them in committing to a recovery that prioritizes a green stimulus.

Hope for ash trees — scientists find genes resistant to deadly beetle

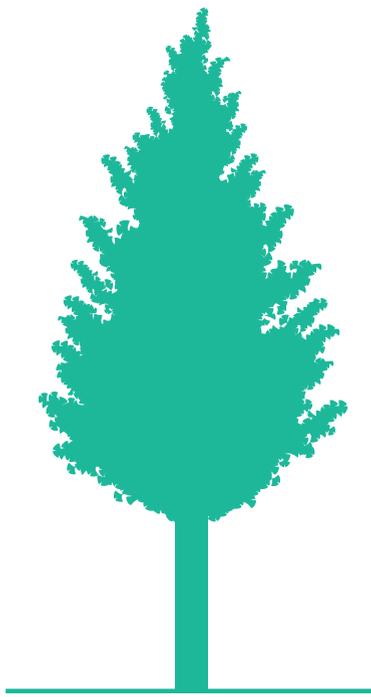


Tens of millions of ash trees have already been killed by the most destructive forest insect to invade the United States, the emerald ash borer.

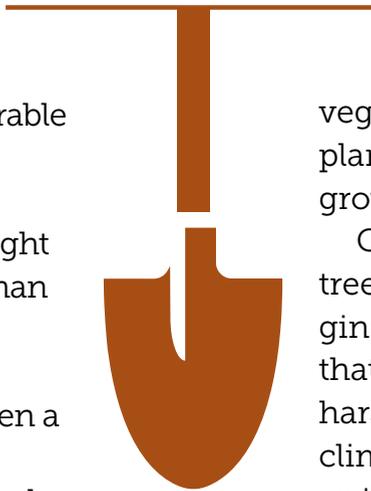
Emerald ash borer (EAB) is an invasive insect native to eastern Asia. It was first identified in Detroit in 2002, and has become one of the most destructive forest insects to invade the United States since its introduction. Tens of millions of ash trees have already been killed in forests and swamps, along waterways and in urban, suburban and rural neighborhoods. But new research findings suggest there may be a way to save ash trees from the pests. An international team of scientists has identified 53 candidate EAB-resistant genes. Their study, published in *Nature Ecology & Evolution* in May 2020, suggests it may be possible to increase the resistance of susceptible ash species through breeding with their resistant relatives. This is promising news for managing an infestation that has severely impacted ash trees in the U.S.



After being incarcerated, William Rucker joined an urban forestry training program with The Greening of Detroit. He now works for "The Greening" but has also started his own landscaping business.



GROWING TREES, GROWING JOBS



“HARD WORK, low pay, miserable conditions, and more!”

On its face, the California Conservation Corps’ motto might seem like more of a warning than a recruiting tool, but for thousands, it represents a promise: new skills, entry to a career, even a bit of an adventure.

And it fairly describes the work of roughly 3,400 young people the state agency trains each year for jobs in forestry and other conservation fields.

Planting tree seedlings on steep hillsides on hot summer days and thinning forests of dense

vegetation so trees already planted there have room to grow is hard work.

Growing and taking care of trees in cities is also hard. Digging large holes for hardy trees that can withstand relatively harsh city environments and climbing trees to prune branches so they won’t fall on cars and

houses can be exhausting.

Yet it’s the kind of work we desperately need more people to do as interest in trees as a solution to climate change

and social inequity takes off across America.

**How restoring forests
across the United States
can help address the
unemployment crisis**

BY MICHELE KURTZ



And, despite how arduous this work is, the opportunity couldn't come at a better time. As of August, 1 in 10 Americans was unemployed. People from under-resourced communities in cities and rural areas — two places that have the highest potential for forestry jobs — are among the hardest hit by the recession.

The World Economic Forum-led global movement — called 1t.org — to conserve, restore and grow 1 trillion trees by 2030 is one significant opportunity to create forestry jobs. Twenty-eight United States-based corporations, governments and nonprofits

“We all know that planting trees for 8 to 10 hours a day is hard work. But I think if we could pay a living wage to both grow the trees and then get the trees in the ground in the right way, that could help.”

— ZANDER EVANS, EXECUTIVE DIRECTOR, THE FOREST STEWARDS GUILD

joined the movement this summer by pledging nearly 850 million trees. American Forests and the World Economic Forum, who lead the U.S. Chapter of 1t.org, are helping to bring their pledges to life.

The opportunity to put large numbers of people to work also stems from another critical and related need: national forests in the U.S. have been devastated by climate change-induced wildfires, droughts, pests and diseases. There's already a 77-million-acre-backlog of land that needs to be

brought back to life. In many places, addressing this need will require a combination of such things as planting trees and thinning dense forests to increase their resilience and diversity and allow new trees to thrive. The backlog is especially dire following reductions in the overall federal forestry workforce and a radical shift in the work being done. An increasing share of federal forestry workers, especially in the western U.S., are fighting wildfires rather than taking care of existing trees and thinning the forests to remove fire fuels.

The need to achieve Tree Equity in cities also creates a chance to put to work people from urban areas hardest hit by unemployment so they can plant and take care of trees in places that need them the most. Tree Equity is about every city neighborhood having enough trees so that every person benefits from them. In most cities, trees are sparse in low-income neighborhoods and some neighborhoods of color.

The Nature Conservancy has identified more than 20 million acres of U.S. public land — a combination of federal, state, tribal and local land, as well as land in cities — that present opportunities for reforestation. Reforesting at that scale could require planting as many as 6 billion trees, a scope of work that would create or support 582,000 jobs, from entry-level tree planters to forest workers and conservation scientists. The price tag: about \$14.66 billion.

“We have an enormous need to restore our forests and plant billions more trees in America,” says Jad Daley, president and CEO of American Forests.

“Given the recession, this is a great opportunity to put legions of people to work in cities and rural areas. We need a mass mobilization. Doing so will require resources, as well as innovative thinking about how to make jobs in the forestry sector alluring and available to everyone.”

A TOUGH SELL

Under any plan to reforest millions of acres in the U.S., entry-level tree planting jobs will be the most plentiful. But filling these types of jobs is challenging. Not only is the work physically demanding, with workers in large forests often planting several hundred trees a day, the pay is low. Last year, the average hourly wage of a forest or conservation worker in the U.S. was \$15.76, and

Below: After two years in the California Conservation Corps, Luna Morales, now a crew leader, can fell trees with a chainsaw and has helped reroute creeks.





Two California Conservation Corps members, working as a sawyer and swamper, remove invasive tamarack plants on Riverside-Corona Resource Conservation District property in Corona, Calif.

hourly rates for tree planters are the lowest in the forestry sector.

What's more, the jobs are seasonal and only last a few months. Most people who plant trees in the U.S. are guest workers. A lot of other forestry work is seasonal, too, including fighting wildfires, growing trees in nurseries and using prescribed burns to manage forests. That can make it difficult to lure people into the field and keep them there.

To attract more workers — and make a lasting impact on people's lives and the economy — we need to build an army of stable, long-term jobs with potential for upward mobility.

A SHARED VISION

One way to build a stable workforce is to cobble together seasonal jobs to create positions that are more stable and last for longer periods of time, says Zander Evans, executive director of the Forest Stewards Guild, a Santa Fe-based professional organization of foresters and other land stewards that also runs training programs. Nursery and planting work could be combined, as could wildfire fighting and work to clear fire-prone underbrush. This would mean training people in several skill sets.

"We all know that planting trees for 8 to 10 hours a day is hard work," Evans says. "But I think if we could pay a living wage to both grow the trees and then get the trees in the ground in the right way, that could help."

But a fragmented forestry sector makes designing those positions complicated. People in forestry jobs, including tree planters and other seasonal workers, are employed by a slew of public agencies

at every level, as well as private industry. Mobilizing a massive army of more robust and stable positions — with paths for upward mobility — would require agencies across government and private employers to work together.

"Building this sort of capacity is really about stitching together, through relationships, the workforce that we'll need," says Brian Kittler, senior director of forest restoration at American Forests.

Recognizing this need, leaders from various forest sectors in recent years have begun creating strategies and policies intended to better leverage the skilled forestry staff in state and federal agencies with added capacity from non-governmental organizations and forestry contractors.

This is an important component of "shared stewardship," a relatively new concept designed to make it easier for governments, nonprofit organizations,

Below: A lot of forestry work is seasonal, including fighting wildfires, growing trees in nurseries and using prescribed burns to manage forests, as is seen here.





Above: California Conservation Corps members rebuild a trail around Madora Lake in Pluma-Eureka State Park near Graeagle, Calif., to meet Americans with Disabilities Act (ADA) accessibility standards.

tribes and private companies to work together and pool their resources in projects that cross forest ownership boundaries. In this vein, the workforce trained and coordinated by the Forest Stewards Guild provides vital labor for tree planting, prescribed fire, restoration thinning and wildland fire fighting across shared landscapes in New Mexico. American Forests works with several states to advance shared stewardship strategies that include examining their workforce needs as restoration work scales up.

The approach could have a major impact in rural communities, where much of the large-scale planting and forest restoration would occur. Even before the COVID-19 pandemic, many rural communities had long been devastated by depressed economies. Stable, year-round jobs both directly and indirectly linked to forests — such as wood product manufacturing or catering to the mas-

sive outdoor recreation industry — would be an economic boon in these areas.

A CAREER PATH

Though they might begin in entry-level positions, Evans says that people in forestry can soon find themselves running drones, doing mapping and even communicating with residents about prescribed burns.

“There is a career ladder,” he says. Making sure that ladder is accessible to those who need it most is more important than ever. One of the best ways to do that is through job training programs such as the California Conservation Corps, which focuses much of its Corps member recruitment on under-resourced communities.

Growing up in a low-income family in a Los Angeles suburb, Luna Morales’ main exposure to nature was a yearly trip to a state park.

After two years in the California program, Morales, now 21, can fell trees with a chainsaw and help reroute creeks. She was promoted to crew leader and is working toward her associate’s degree. “With the background I came from,” Morales says, “I never would have expected to be here.”

“The Cs,” as its members call it, was created by the state of California in 1976. Modeled loosely after the national Civilian Conservation Corps that put 3 million people to work during the Great Depression, it is a state agency and a model American Forests and others believe could be replicated during the current recession.

Corps members receive a \$1,905 monthly stipend while getting on-the-job training in everything from building and clearing trails to cutting down dead trees and responding to natural and manmade disasters. American Forests



Rucker is hiring others from The Greening of Detroit, one of American Forests’ partners, to work for his own landscaping business because he says the program ensures they are qualified and dependable.



works with the group on a number of planting and shrub-clearing projects.

Workforce development programs are also key in urban areas — especially low-income neighborhoods and some communities of color, which tend to have fewer trees and the highest unemployment. The need for people who can plant, trim and prune trees in cities is expected to grow 10% by 2028.

That’s why American Forests works with job training partners in several cities to support and increase capacity for urban forestry programs, through our Tree Equity: Career Pathways Initiative. We have also developed a guide for creating entry-level urban forestry career pathways programs that target people in communities who could benefit most from entering the field.

“It’s definitely a moment where we’re crystal clear about the cost of inaction on our forests, and we are crystal clear about the coordinated effort that it’s going to take to actually make significant change,” says Sarah Lillie Anderson, senior manager of American Forests’ Tree Equity programs.

Take William Rucker of Detroit, for example. He had never held a job outside of prison, which he was released from in 2019. He enrolled in an urban forestry training program offered by The Greening of Detroit, a nonprofit that plants trees and provides education and workforce development for people from under-resourced communities, many of them formerly incarcerated.

Rucker has since been hired by “The Greening,” one of American Forests’ partners, and also started his own landscaping business, serving about 30 houses a day. He plans to expand soon and put others to work.

“I’m hiring people from The Greening because I know they’ve been taught, they have qualifications and I can depend on them to show up for work every day,” he says.

Besides forestry skills training, the organization provides a range of support services, helping participants with transportation and housing, as well as basic training about being on time for work. These “wraparound” support services have contributed mightily toward the program’s 87% job placement rate, says Vice President Monica Tabares.

A FIRST STEP

Fortunately, proposals to reforest millions of acres of U.S. forests — and train and hire the workers to do it — have gained steam in Congress in the last several months. This summer, a bipartisan bill called the Great American Outdoors Act was signed into law, providing \$900 million annually to

expand America’s public land and provide grants to private forest owners to voluntarily protect their forests through conservation easements.

To complement that achievement, American Forests helped draft The REPLANT Act, which focuses on conserving the national forests we have, largely by planting trees. The act would provide 49,000 new jobs to reforest 1.2 billion trees. This legislation was introduced in the House and the Senate in July, with bi-partisan support.

But much more will be needed.

“Rarely have we had an opportunity to address two huge crises, climate change and the economy, at the same time. This is the moment to be bold.”

— JAD DALEY, PRESIDENT AND CEO, AMERICAN FORESTS

Whether a major workforce expansion involves reinstating the Civilian Conservation Corps, rethinking how to create full-time forest sector jobs, developing more accessible training and paths to careers — or more than likely some combination — the time to act is now. We need to plant and take care of billions of trees. And millions of Americans are out of work.

“Rarely have we had an opportunity to address two huge crises, climate change and the economy, at the same time,” says Daley, of American Forests. “This is the moment to be bold.”

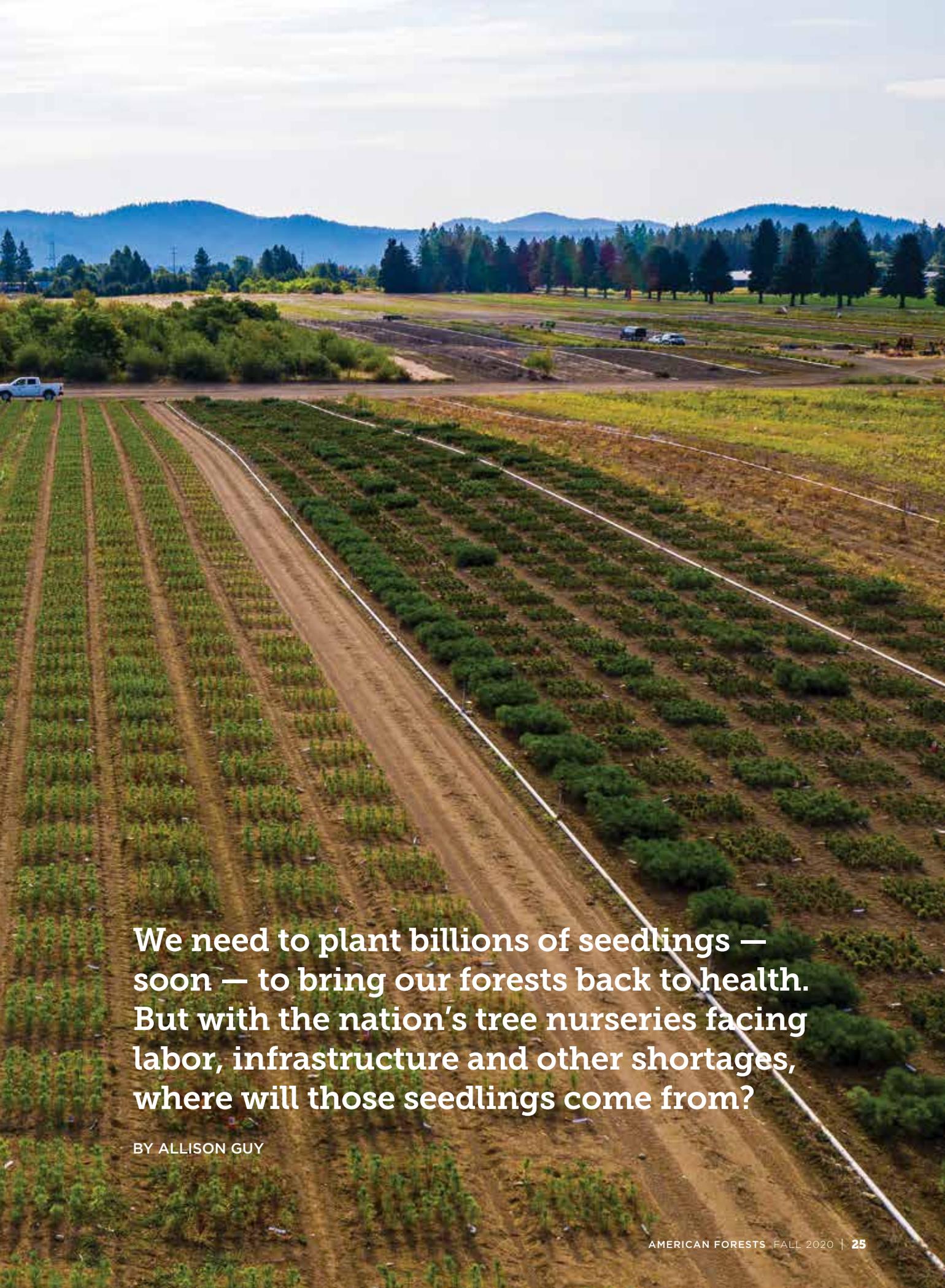
Michele Kurtz writes from Washington, D.C., and is American Forests’ director of communications.

Below: Tahoe Center California Conservation Corps members shape rocks to create the siding for an ADA accessible trail at Grover Hot Springs State Park in Markleeville, Calif.





GROWING PAINS: THE RACE TO PLANT BILLIONS OF TREES



We need to plant billions of seedlings — soon — to bring our forests back to health. But with the nation's tree nurseries facing labor, infrastructure and other shortages, where will those seedlings come from?

BY ALLISON GUY

PLANT ECOLOGIST Kimberly Wahl-Villareal found herself battling a gnawing problem last year. Rats were making a nightly buffet of the tree seedlings at the United States Fish and Wildlife Service nursery she manages south of Alamo, Texas.

Because the nursery sits within the Lower Rio Grande Valley National Wildlife Refuge, full of rare wildlife, Wahl couldn't use poison. Her only option was rat-proof barriers made of metal panels. But even though the nursery "looked like a spaceship," Wahl said, some rats still managed to sneak in. Help finally came from the skies, when the refuge's owl population developed a taste for nursery-grown rodent.

Rats aren't the only problem pestering nurseries in the United States. One of the biggest challenges that nurseries face? Producing billions more tree seedlings in the next few years.

In the U.S., an area the size of California and Kentucky combined has reforestation potential, requiring as many as 40 billion trees. Forests can regrow on their own, but they often can't do it fast enough. On U.S. Forest Service land, for example, natural regrowth only meets 40% of the reforestation need.

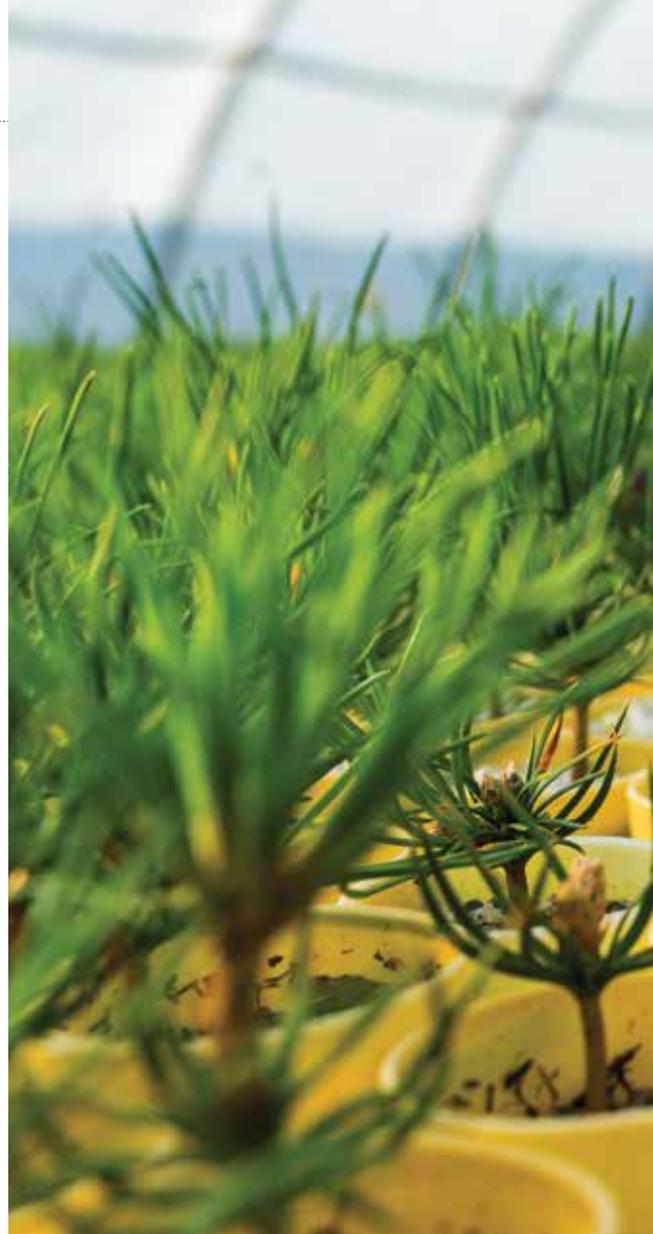
We must replant forests as soon as possible, experts say, or risk permanently losing these landscapes and their benefits for climate, water and more. Yet many nurseries are already producing as many seedlings as they can. Others are beset by labor, funding and seed shortages.

"These problems can be overcome," says Eric Sprague, American Forests' vice president of forest restoration. "This is the time for trees. If ever there was a moment to get people interested in a mass scaling-up of nursery capacity, now is it."

Preceding pages: Workers at the U.S. Forest Service nursery in Coeur d'Alene, Idaho, study the effects of blister rust infection on western white pine seedlings.



As seen from above, shade cloth protects thornforest seedlings at the U.S. Fish and Wildlife Service nursery south of Alamo, Texas.



To do so will take concerted action from the government, civil society and the private sector — as well as a few hungry owls.

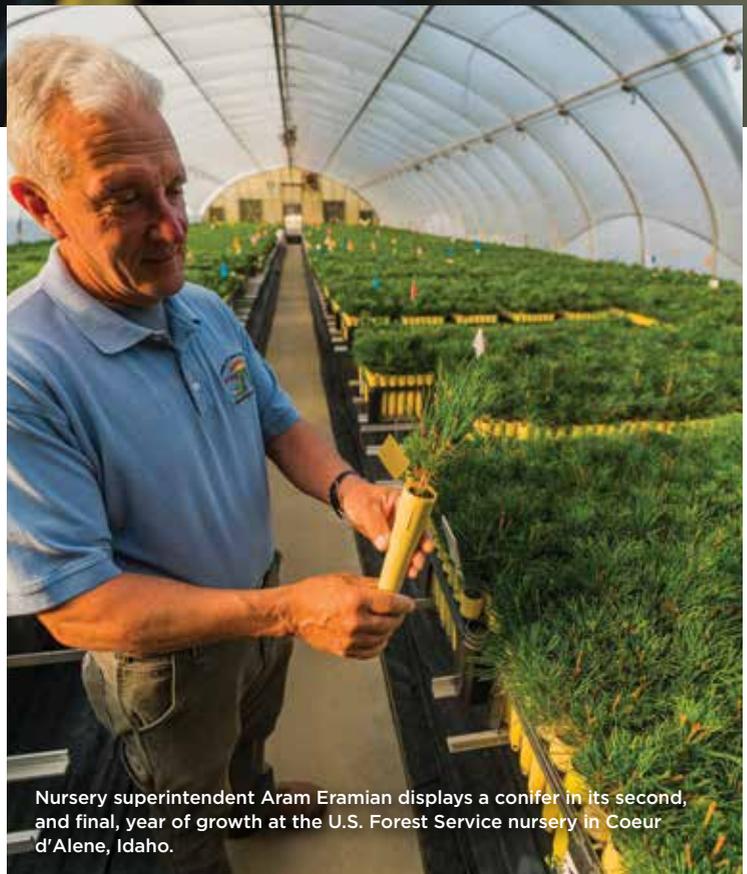
A TICKING TREE BOMB

Each year, nurseries in the U.S. ship 1.2 billion tree seedlings to planting sites, enough to reforest 2.2 million acres. Yet a total of 131 million acres has potential to be reforested, with 20 million of those on public land and another 19 million on urban and suburban land, according to one recent estimate from The Nature Conservancy. This need grows by hundreds of thousands of acres each year as climate change fuels unprecedented wildfires, droughts, diseases and pest outbreaks, particularly in the western U.S.

If the U.S. wanted to reforest every last of these 131 million acres by 2030 — an ambitious goal — it would need an extra 2.8 billion trees each year, more than doubling the country's seedling output. In a recent survey from American Forests and The Nature Conservancy, tree producers



Left: Young western white pine seedlings grow in the U.S. Forest Service nursery in Coeur d'Alene, Idaho.



Nursery superintendent Aram Eramian displays a conifer in its second, and final, year of growth at the U.S. Forest Service nursery in Coeur d'Alene, Idaho.

reported that, on average, they can boost seedling production by just one-third using their existing infrastructure. The survey's respondents manage a total of 40% of the country's nursery capacity.

Setting 2030 as a goal might seem like a quick turnaround in the slow-and-steady world of trees, but there's reason to act fast. "A real sense of urgency is being driven by climate change," Sprague says. With little time left to stave off catastrophic climate change, we need to plant trees now to start securing their carbon sequestering benefits as soon as possible.

Another urgent factor, Sprague explains, is how swiftly invasive plants and other weedy species take over forests that have been decimated by climate change-fueled wildfires, droughts and other threats. It's much harder and costlier to replant a forest once these invaders have taken hold. "The longer you wait the more of a challenge it becomes," Sprague says.

For some nurseries, doubling production would be easy. At the sprawling U.S. Forest



“They’d have to have some sort of guarantee that it would be worth their while ... not just for five years, but for the longer term.”

— DIANE HAASE, THE WESTERN NURSERY SPECIALIST FOR THE FOREST SERVICE

Service nursery in Coeur d’Alene, Idaho, a staff of 26 produces 4 to 5 million trees a year. Nursery superintendent Aram Eramian says that he could double the production of field-grown tree seedlings within two years, and he’d only have to hire one extra full-time employee to do so.

In Texas, things are more complicated. Wahl’s nursery is already at capacity — growing 114,000 seedlings a year — and the small private nurseries she contracts with are also maxed out. Doubling output would require doubling her workforce, securing more transport trucks, and finding more space

to grow, store and sort seedlings, a process that can take a long time. Wahl, however, is eager to expand and is working to boost the nursery’s capacity to grow 156,000 seedlings within the next two years, and has longer-term aspirations to double that.

TAKING CARE OF BUSINESS

If time isn’t on nurseries’ side, then neither is labor. Many nursery jobs are seasonal and struggle to attract U.S. workers. Because of this, “a lot of nurseries rely on immigrant crews,” says Diane Haase, the western nursery specialist for

Below: Kuldeep Singh, nursery manager, inspects the roots of a conifer seedling in the L.A. Moran Reforestation Center greenhouse in Davis, Calif.

BELOW: LUCIANE COLETTI





Left: Nathan Zambino takes measurements and makes observations of a young tree with blister rust infection at the U.S. Forest Service nursery in Coeur d'Alene, Idaho. Below: Molly Retzlaff tends to a large group of young conifers at the U.S. Forest Service nursery in Coeur d'Alene, Idaho.

the Forest Service. But as immigration rules are tightened, nurseries are “having a harder and harder time getting the crews that they need.”

Some nurseries in remote areas, Haase says, don't even have access to migrant workers. They rely on retirees, which presents its own set of challenges. The local retiree pool is often limited, and older workers have physical limitations that younger ones don't.

The L.A. Moran Reforestation Center in Davis, Calif., faces its own workforce concerns. Shuttered after state budget cuts in 2003, L.A. Moran reopened in 2017. It is now in the middle of a five-year ramp-up to its full capacity of 450,000 seedlings. The government agency that operates the nursery supplies lead horticulturalist Kuldeep Singh with inmate workers. But, because inmates aren't allowed to work at the same location two days in a row, Singh contends with an ever-changing cast. “You teach them one day,” Singh says, “then they come the next day and you have to teach them again.” His job should get easier once he reaches an agreement with the California Conservation Corps, whose members can stay on-site longer and learn more of the intricacies of nursery work.

Beyond labor shortages, many nurseries are likely to be wary of scaling up for reforestation commitments that last for just a few years, Haase says. It takes a lot of money and time to secure more land and water, build new greenhouses and buy more equipment — and all the while, there's no guarantee that this investment is worth the risk. Nurseries can spend two years growing an order of seedlings, Haase says, only to have a customer back out at the last minute. “It can really ruin your business.”

If nurseries were asked to massively amp up their seedling output, Haase explains, “they'd have to have some sort of guarantee that it would be worth their while ... not just for five years, but for the longer term.”



NATURE VS. NURSERIES

Nurseries also deal with whole strata of complexity beyond typical business concerns. Trees are not “widgets,” Haase says. “They're biological organisms.” And living things don't always cooperate.

Take seeds. Often, nurseries have to collect seeds from the wild, which is tricky business. In Texas, Wahl's team braves heat that “feels like a blow dryer” as they fan out to nab seeds from plant populations across the Lower Rio Grande Valley — the more diverse the genetics, the thinking goes, the better a replanted forest can withstand the whims of climate change.

The forest, however, can have its own ideas. Some years there's poor pollination or an early drought, and plants don't produce enough seeds to collect. Other years, there's a late drought, and the plants abort their developing seeds. And sometimes there's plenty of seeds, Wahl says, but by the time staff can get to it, “the animals already collected it.”

Wahl's team, at least, can do its work from reasonable heights. In California, “cone collectors” like Robert Beauchamp sometimes ascend over 200 feet to nab the cones of giant sequoias.



Jessica Huang, seed bank manager at the L.A. Moran Reforestation Center, prepares to perform seed viability tests on freshly germinated seeds.

LUCIANE COLETTI



and timber companies. Singh is contemplating contracting a cone collector for his nursery, but it's not cheap, and since cone collectors are in such high demand, they might not even have time for the nursery's specific collection needs.

These seed issues are common. On average, nurseries have a 3.7-year supply of conifer seeds but just 1.4 years for hardwood species, according to the survey from American Forests and The Nature Conservancy. They might have plenty of one type of tree on hand, but not enough of another.

"In general, we don't have enough seed banks that would allow us to scale up to the trillion trees that we're looking for," says Owen Burney, a silviculturalist at New Mexico State University. "Seed, I would say, is the most important piece because, without it, nothing else works. And it's definitely a broken system."

Left: Examples of cones and seeds from Sierra and coast redwoods, from the seed bank exposition at the L.A. Moran Reforestation Center. **Below right:** Singh opens the door to the seed bank freezer where 43,000 pounds of seeds are stored at the L.A. Moran Reforestation Center. **Below left:** The Seed Archive at the U.S. Forest Service nursery in Coeur d'Alene, Idaho, holds 10 years' worth of seeds in barrels in several large freezers.

During the frenzy of seed season, Beauchamp and his climbers pull brutal days zipping up and down lodgepole pines or Douglas-firs, then driving hundreds of miles overnight to repeat the process in other forests.

"It's a very hectic, random schedule in doing the cone collection," Beauchamp says. "Different foresters need me at different times, but when they need me, they need me within a few days."

Many conifer species produce bumper crops irregularly every few years, and their seeds have frustratingly short collection windows. If Beauchamp gets to the cones a few days too early, the seeds won't sprout. Wait for the cones to open or tumble to the ground, he says, and "you've lost your crop."

Here, the whims of nature collide with the facts of labor and money. Singh, of the L.A. Moran Reforestation Center, struggles to get the specific low-elevation seeds he needs from cone collectors like Beauchamp, who usually collect high-elevation seeds for the Forest Service



TOP LEFT AND LOWER RIGHT: LUCIANE COLETTI; BOTTOM LEFT: CHRIS CELENTANO/CDC PHOTOGRAPHY



”As corporations, governments and NGOs make pledges to plant trees, this is our moment to say: You can’t do this without nurseries. It’s going to take leadership at all levels.”

— ERIC SPRAGUE, VICE PRESIDENT OF FOREST RESTORATION, AMERICAN FORESTS

TOUGH LOVE

Burney also works on a different part of the “reforestation pipeline” that’s in need of a tune-up: how seedlings are raised. Traditional wisdom goes that the healthier a seedling is, the more likely it is to survive once it’s planted in the wild. With this in mind, nurseries coddle trees with plenty of water, rich soil and stable greenhouse temperatures.

But lots of these pampered babies fail once they’re transplanted to their final homes. Depending on the planting site, an acceptable death rate can range from 5% to 50%. Sometimes, as many as 90% of seedlings perish. Drought, heat waves and wildfires are a fact of life outside of nurseries — and climate change is only making these threats more extreme.

At the John T. Harrington Forestry Research Center, the Southwest’s biggest producer of forest seedlings, Burney and his colleagues are testing another approach. Within a few days of germination, the team deprives certain seedlings of water.

They wait just to the point of wilting, then give them a good soaking. This boom-and-bust watering cycle continues until the seedlings are ready to be planted in the wild.

Burney hypothesized that this “tough love” can make trees more resistant to drought, and so far, his experiments are proving him right. Of 800 Ponderosa seedlings planted in conditions expected to be fatal to the young trees, 109 survived, and 92 of those were graduates of the tough love program.

Under a microscope, it’s clear what makes the tough love seedlings different: more efficient xylem, a tissue that acts both as a tree’s drinking straws and structural support. This novel research is eliciting “big interest” from nurseries, Burney says, and some are already testing giving seedlings less to drink. But Burney’s approach — meticulously watering and drying seedlings without killing them — is too labor-intensive for most nurseries. To reap the full benefits of tough love, new technology is needed, along with the money to fund it.



LET THE LIGHT IN

Money is always a concern, “but with the right policy and market signals, nurseries will be able to ramp up production,” says Sprague, of American Forests. “Ambitious goals to grow billions more trees this decade are certainly possible, but we need to scale up funding to meet the challenge.”

It’s going to take the right combination of public investment, philanthropy and climate mitigation initiatives. Sprague cited The REPLANT Act, American Forests-led legislation introduced in the House and Senate in July, as one promising funding opportunity. If passed, the act would boost the Forest Service’s Reforestation Trust Fund for forestry work, including nursery development, from \$30 million a year — an amount that hasn’t changed since the 1980s — to around \$120 million a year.

But more is needed. The World Economic Forum’s 1t.org initiative offers a platform for

governments, corporations and other groups to make pledges towards planting a trillion trees globally. American Forests, which leads the U.S. Chapter of 1t.org in partnership with the World Economic Forum, plans to build on the current momentum for reforestation to support nursery development across the country.

“As corporations, governments and NGOs make pledges to plant trees, this is our moment to say: You can’t do this without nurseries,” Sprague says. “It’s going to take leadership at all levels.”

Right now, American Forests is continuing to study the barriers to boosting nursery output, and how to overcome those barriers. No doubt there will be some surprises in the mix: that’s just the nature of the nursery business.

For Wahl, back in Texas, the spring brought its own major surprise: the coronavirus pandemic. For safety reasons, only one person at a time can currently work in the nursery. Without humans around to help out, even the owls couldn’t keep up with the rats. Wahl’s solution? Install stadium-style lighting to spook the rodents at night. Rats — like the other gnawing problems that nurseries face — are best tackled in the light. 🍀

Above and far left: Conifer seedlings grow at the L.A. Moran Reforestation Center. Below: American Forests’ Vice President of Forest Restoration Eric Sprague observes the seedlings at the U.S. Fish and Wildlife Service nursery in the Lower Rio Grande Valley.



Allison Guy writes from Washington, D.C., and is American Forests’ senior manager of communications, American ReLeaf.





Replanting Paradise

The endeavor to grow forests that can take on the future impacts of climate change

BY AUSTIN REMPEL

CLIMATE-RESILIENT REFORESTATION is going to look different in every part of the United States. But it will be — and already is — important everywhere, given the dire need to adapt to the rapidly changing climate.

One such place is California, where wildfires have ravaged more than 6.5 million acres since 2015. But this summer seemed to foreshadow a scale far worse. In one week alone, lightning strikes sparked hundreds of wildfires that devastated 1 million acres and killed countless trees. The state's megafires are visual, visceral examples of climate-driven disasters. The 2018 fire that burned the mountain town of Paradise — known as the Camp Fire, which was California's deadliest and most destructive wildfire ever — shocked the nation and showed just what might be in store for forests and people as climate change heats up.

Left: Wolfy Rougle, of the Butte County Resource Conservation District, stands above the Concow Basin, surveying draft plans for three innovative reforestation trials to regrow forests after the Camp Fire.



KARA CAPALDO / ADOBE STOCK

In 2018, the Camp Fire, which was California's deadliest and most destructive wildfire ever, burned almost 240 square miles — an area the size of Chicago — and killed 85 people.

“We have a moral obligation to replant the Concow region through a climate-smart lens. It would be nice if there was a silver-bullet-like solution — but there isn't. Conditions are changing under our feet (literally), but by finding climate-smart solutions, we can redefine what it means to live in Paradise for years to come.”

— BRITTANY DYER, CALIFORNIA STATE DIRECTOR, AMERICAN FORESTS

But the Camp Fire burn scar has also emerged as a landscape-sized laboratory where a group of forward-looking forest scientists and land managers from American Forests and elsewhere are pioneering ways to grow future-ready forests that can withstand the impacts of climate change. This is a story about some of the places and people at the heart of that effort.

THE CONCOW RESILIENCE PROJECT

The Camp Fire burned almost 240 square miles — an area the size of Chicago — and killed 85 people. It destroyed nearly 19,000 homes and businesses in Butte County, Calif., and leveled the towns of Paradise and Concow.

But the Camp Fire was only the latest in a series of severe wildfires to hit the region. Foresters and landowners were ready to try something new, given a hostile new climate coming into focus — one with earlier springs, hotter summers and more severe droughts — and forests clearly unequipped to withstand such conditions, partly due to years of suppressing fires. They saw the burned landscape as an opportunity to try to grow a forest that could withstand these harsh conditions.

“The gift that the Camp Fire gave us is that it helped us to see what isn't working. People became permeable to new ideas,” says Wolfy Rougle,



The Camp Fire destroyed nearly 19,000 homes and businesses in Butte County, Calif., and leveled the towns of Paradise and Concow.

TINA LAWHON / SHUTTERSTOCK

ALL IMAGES, UNLESS OTHERWISE NOTED: AMERICAN FORESTS

the forest health watershed coordinator with the Butte County Resource Conservation District.

In 2019, Rougle assembled local land managers, climate scientists and nonprofit leaders, including Brittany Dyer, American Forests' California state director. In a series of walks across the charred landscape, they began to envision what a more climate-resilient forest might look like and how to get there.

They chose to focus on Concow, in part because of its unique history of burning in large wildfires, including the Camp Fire. What they learn may guide forest adaptation across California's low-elevation foothills — millions of acres in total — that are warming up and drying out faster than almost anywhere in the state, outside of the Mojave Desert.

Early on, the group outlined their vision for the restored landscape. They seek to sustain the region's forests which, with fires and sustained drought, are gradually being replaced by highly flammable shrub fields. The forests they're imagining will have fewer trees, and the trees will be larger and more widely spaced than those in today's forests. A less dense forest will be able to weather fires, beetle outbreaks and droughts, and allow trees to accumulate carbon in their roots and trunks, and in the soil beneath them. Healthy forests function as a carbon sink — helping to reduce the amount of carbon dioxide in the atmosphere, rather than releasing it back to the skies every time a disturbance strikes. A restored watershed would also provide clean and abundant water supply for those living downstream. And Concow residents, many of whom chose to



live in the region for its forests, would enjoy safer economic and recreation opportunities.

“We have a moral obligation to replant the Concow region through a climate-smart lens,” Dyer says. “It would be nice if there was a silver-bullet-like solution — but there isn’t. Conditions are changing under our feet (literally), but by finding climate-smart solutions, we can redefine what it means to live in Paradise for years to come.”

The group is bringing its vision to life by testing three different reforestation approaches in the hardest-hit parts of the region. Their motto is short and sweet: “Plant trees. Not too many. Mostly oaks.” They aim to learn as much as possible and to do so as fast as possible.

“We need to try a lot of different things,” Rougle says. “A lot of it might not work, but a lot of conventional reforestation doesn’t work — so why keep doing only that?”





BRING BACK THE OAKS

The first approach is to nurture oak trees that survived and re-sprouted after the fire. Oaks are the only tree that are coming back in most parts of the burn. Even when an oak's top completely burns, it can re-sprout from its root system.

There aren't many big oaks left. Locals cite the culprits as a history of intense grazing and logging; a lack of regular, small fires that clear out some of the vegetation; and, conversely, too many big fires. But oaks may be key to building a more resilient forest. Rougle plans to give the oaks a helping hand by thinning competing shrubs so that the young trees have more room to grow, pruning to encourage them to grow up and out of the reach of flames, and jump-starting growth of a grassy understory, rather than one dominated by shrubs. The goal of this is to see whether an oak savannah can be coaxed into existence.

Signs that oaks may be a climate-smart bet are everywhere in California. The state's oak savannahs — grasslands interspersed with massive, umbrella-shaped oak trees — are common at lower elevations. Oaks tend to dominate in areas where the climate is already as hot and dry as we expect the Concow area to be in coming decades. And oak savannahs are resilient to fire. A grassy understory with a few large trees can accommodate fire much better than an overgrown forest where flames easily race from treetop to treetop.

And Rougle has noticed yet another clue: acorn grinding stones are everywhere, left by the Concow Maidu, the Native American tribe that is indigenous to the area.

"You even find them on ridgetops, rather than just alongside rivers where I'm used to seeing them," Rougle says. "And the grinding stones are deep, meaning they were used generation after generation." This suggests that, not too long ago, the region was full of large oaks, likely maintained with regular prescribed fires set by the Concow Maidu.

FORESTS FORGED WITH FIRE

The second reforestation model the group proposes explores whether young trees can survive, and possibly even benefit from, prescribed or controlled fires. They aim to create a landscape similar to what the Concow Maidu cultivated centuries ago — one adapted to and maintained by fire. Many foresters would be shocked by the

Facing page: These incense cedars survived the Camp Fire. They grew up together and developed the tall lollipop shape because they were racing each other to reach sunlight. Having all their needles at the top, with bare trunks most of the way down, likely helped them survive the fire.

"We need to try a lot of different things. A lot of it might not work, but a lot of conventional reforestation doesn't work — so why keep doing only that?"

— WOLFY ROUGLE, THE FOREST HEALTH WATERSHED COORDINATOR, BUTTE COUNTY RESOURCE CONSERVATION DISTRICT



A mix of incense cedar and Ponderosa pine that died in the Camp Fire on Bureau of Land Management land just north of Paradise, Calif. Most of these trees will be logged because the wood is still very valuable, and surviving trees will be left. American Forests will be planting at this site in spring 2021.

Right: Planting seedlings with larger, more developed root systems, such as the container-grown Douglas-fir seedlings pictured here, confers drought resistance and the ability to compete with wild plants.



idea of intentionally setting fires anywhere near planted trees. But, in California and many other parts of the American West, reforestation efforts will need to accommodate this type of “good fire.” The emerging collaboration between fire practitioners and foresters has created a new field of study called pyrosilviculture.

It’s not just public land managers who see the benefits of good fire. Landowners in the Camp Fire area also are eager to figure out how it can be done. For her master’s thesis, Rougle surveyed Butte County residents whose land burned in the fire. Seven out of every 10 landowners were interested in applying prescribed fire to their land. Eight out of every 10 said they wanted to replant. But the most surprising thing she discovered was the overlap between the two — landowners want reforestation programs that allow prescribed burns. In fact, 59% of surveyed landowners who expressed interest in reforesting their land also hope to safely burn that same land someday.

The Butte County Resource Conservation District, where Rougle works, has started a prescribed fire association. It is a means for landowners to come together to complete small, home-scale burns. At some point, the region may be able to escape the cycle of catastrophic wildfire, thanks to regular application of good fire by a community of local forest tenders.

Cluster planting may be a way to reconcile the seemingly conflicting goals of reforestation and prescribed fire. Simply put, cluster planting is like social distancing for trees.

Below: Boxes of seedlings from Cal Fire’s nursery in Davis, Calif., the L.A. Moran Reforestation Center, sit in a cooler until they are ready to be planted.





The planting crew at the Bureau of Land Management site this past spring loads their planting bags with seedlings from the tree cooler and heads back out to plant in the burn.





It involves planting seedlings in clumps or patches at a distance from each other. The best growing spots are targeted, and patterns of natural regeneration are mimicked. There's a tantalizing possibility that this could make it harder for fires to jump from clump to clump.

Cluster planting is different than traditional planting, where foresters plant in neat, densely packed rows to help trees outcompete other vegetation. The wisdom of this practice — “pines in lines” — hinges on the ability to come back with chainsaws to thin out young trees before they start to crowd each other. If they grow too close to each other, flames can easily spread from tree to tree, putting the whole stand at risk of burning.

But this follow-up care is expensive and often falls by the wayside. Due to endless budget cuts, foresters are forced to let the young stands fend for themselves. One recent analysis showed that 57% of the plantations established in the Sierras between 1993 and 2016 have never been thinned. Now more than ever, we can't just plant “pines in lines” and walk away.

ASSISTED MIGRATION

The last approach being trialed focuses on whether conifer seed sources from warmer and drier sites might outperform the traditional, local seed sources.

Here's where Dr. Jessica Wright — research geneticist at the U.S.D.A Forest Service Pacific Southwest Research Station, and one of the scientists that Rougle invited to the Concow region — enters the picture. Her research team is quickly revealing that the forests growing today are already out of sync with our current climate, much less the climate we can expect 50 years from now. This concept of trees lagging behind a rapidly changing climate adds a whole new dimension to the idea of “right tree, right place.”

Wright is carefully selecting Ponderosa pine seeds from various parts of California to see if any lead to faster growth and higher survival in



This Douglas-fir was grown from seed collected on the California coast. Planting in the Sierra foothills, far from the seed's origin, and at higher elevation is an unorthodox but climate-informed tactic. Douglas-fir that are adapted to conditions in the interior of the California coast range, which is already as hot and dry as the Camp Fire region is expected to become, may be able to withstand these future climates better.

Left: Tree planters planting in the burn scar left by the Carr Fire, 80 miles north of Paradise in Northern California. The Carr Fire burned 230,000 acres in the sweltering summer of 2018 — just months before the Camp Fire.



A Ponderosa pine seedling planted in California's San Bernardino Mountains. Shrubs can prevent post-fire forest recovery by outcompeting tree seedlings for light, nutrients and moisture. Elsewhere, including the southwestern U.S., shrubs act as 'nurse plants' that shade seedlings and help them to survive. This contrast — threat in one ecosystem, salvation in another — illustrates how reforestation and climate adaptation will look different in every forest.

Concow. How much do tree genetics matter?

A lot, according to research conducted elsewhere. Trees from southerly latitudes and lower elevations may grow faster, invest more of their energy into root growth in preparation for drought or have needles that surrender less water.

“Every reforestation project is an opportunity to find the best seed for that site,” says Wright.

There's also increasing recognition that more seeds need to be collected from mother trees that may have “survivor” genetics. These are trees that have demonstrated resistance to beetles, droughts and diseases. They are the last ones standing after a tree-killing event. Or they are trees that have found a way to survive in especially harsh environments. Forest researchers are busy testing these ideas in the Lake Tahoe Basin — 100 miles southeast of Concow — and elsewhere in the U.S. The hope is that increasing the number of trees on the landscape with these survivor genes could speed up adaptation and help forests survive and thrive in the coming century.

LIFEBOATS FOR TREES

A mile and a half west of Concow, American Forests is also working with the federal Bureau of Land Management (BLM) to formulate a plan to restore the burned land that is under the agency's care.

One of the more promising approaches is trying to pinpoint places where seedlings may have an edge. Seedlings have none of the advantages that adult trees do, like deep roots to tap groundwater, thick bark to buffer them from bouts of extreme weather, and high branches that avoid the reach of flames. Survival often comes down to luck — a string of wet, cool years in early life, for example, or having a rock or log nearby to shield them from the heat of the day.

To boost their chances of surviving, it's important to choose the right places to protect and the right places to plant. Certain spots, for example, may shield trees and seedlings from the worst of climate change. Scientists call these special spots “refugia.” The hope is they can act as lifeboats when large landscapes experience big, forest-killing events.

At the highest level, refugia are parts of the forest where something akin to a hack allows

them to survive even the worst weather. For example, in the desert southwest, stands of piñon pine have been discovered in the middle of miles and miles of dead forests that succumbed to drought. Research suggests that these stands were sustained by access to rare groundwater seeps. In the northern Rockies, whitebark pines perched on rocky cliffs continually evade fires and waves of beetles because nothing can reach them.

Some of these safe zones immediately catch one's eye in the Camp Fire scar, too. For example, trees surrounding Concow Reservoir have repeatedly escaped the worst of the fires, likely due to the higher humidity and cooler air temperatures around the lake. Other examples stand out too — like the lone gray pines that avoided the brunt of the blaze by virtue of growing apart from other plants, on the harshest, driest soils and steepest slopes, where flames couldn't reach.

In the Concow area, below the barren, scorched hillsides, there's a small mountain stream trickling at the bottom of a steep ravine. It's shaded here for much of the day and feels about 10 degrees

“The gift that the Camp Fire gave us is that it helped us to see what isn't working. People became permeable to new ideas.”

— WOLFY ROUGLE

cooler. Yellow-legged frogs and rough-skinned newts breed in the stream's shallow pools. This ravine is where American Forests planted the most sensitive seedlings, including Douglas-fir, which is projected to disappear from most of the Camp Fire area as temperatures soar.

It's places like these — and the involvement of people like Rougle, Wright, Dyer and countless landowners in the Camp Fire area who've shown remarkable resilience and commitment to finding innovative solutions — that are our greatest hope for future forests in a time of climate change. ↓

Austin Rempel writes from southwestern Colorado and is American Forests' senior manager of forest restoration.

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Rhode Island Governor, a Tree Equity champion

AT 1,200 SQUARE MILES, Rhode Island is the nation's smallest state. But under the leadership of Governor Gina Raimondo, it's become an outsized influencer in promoting the value of urban forests to address climate change, public health and employment issues. For her work in implementing a bold strategy to plant and protect trees, particularly in low-income neighborhoods, American Forests honored the governor with its inaugural Tree Equity Champion Award in September.

Raimondo was the force behind Rhode Island's 2017 decision to become a founding member of the 25-state U.S. Climate Alliance, which pledged to take immediate action to address climate change. Her administration has backed that commitment with several initiatives that emphasize the role forests play in improving climate resilience.

Partnering with American Forests, Rhode Island is now building the methodology for a Tree Equity Score, which helps prioritize investment in neighborhoods where low tree canopy overlaps with socioeconomic needs. The state is also piloting a suite of planning, policy and finance tools that cities, nonprofits and other groups can use to optimize their urban forests to address climate change and public health needs. A companion Tree Equity Score planning tool, launching this fall, offers GIS-based resources

that help under-resourced populations pinpoint where new tree plantings will have the most potential to improve public health, reduce energy use through natural cooling and remove carbon from the atmosphere.

"Rhode Island is leading in the fight against climate change. As the fastest warming continental state, we know we don't have time to waste," Raimondo says. "This initiative builds on our statewide climate resilience strategy, Resilient Rhody, and highlights the urgency for urban tree canopy as a critical infrastructure on the front lines."

With heat-related deaths projected to increase ten-fold in eastern U.S. cities by 2050, Rhode Island is focused on expanding urban forests to alleviate health problems caused by rising temperatures in the state's Health Equity Zones, which are often lower-income communities with less tree cover and poorer air quality.

"Rhode Island is riveted on the equity and practical issues around urban forestry. Our goal is to increase the tree canopy in our cities and to get this right! That means taking a strategic approach to all aspects of Tree Equity," says Rhode Island Department of Environmental Management Director, Janet Coit. "Through a diverse coalition of stakeholders, we are creating state-of-the-art tools, finance mechanisms, and policies to ensure long-term success in both planting and maintaining a healthy urban forest to enhance quality of life for generations to come." 🌱



Left: American Forests honored Governor Gina M. Raimondo with its inaugural Tree Equity Champion Award in September. Right: Raimondo volunteers at a tree planting event in Woonsocket, R.I. on Arbor Day 2019.

last look



THE NATURE RIGHT AROUND ME

A CAREER DOCUMENTING WILDLIFE has taken Morgan Heim to exotic far-flung destinations, including the Himalayas, Thailand and Colombia. But when the pandemic forced the journalist and photographer to stay close to home this year, Heim discovered a fascinating world of wildlife bustled just outside her back door in Astoria, Ore.

Heim has identified more than 40 species of birds using her yard, a hilltop plot where the land transitions between forest and suburban development that is near water. She's grown so familiar with certain recurring visitors that she's named them. "I don't think I realized how truly oblivious I was to the nature right around me, until now," Heim says.

Here are photos of a handful of the birds and mammals Heim spotted and descriptions of them in her own words.



▲ A deer stomps after another following what I can only describe as a childlike spat over a favorite toy. As I watched, one deer kicked the other while foraging from a bird feeder, prompting retaliatory kicks and a chase. But the two quickly went back to foraging in their respective spots.

◀ Battles erupt as more pine siskins try to fit at the feeder. The siskins are bold and confident birds for their delicate size and have been showing up in growing numbers.



A California scrub-jay is the first bird to explore a new Audubon window feeder I've placed at the back of the house. The feeders help birds avoid collisions with windows by training them to see specific windows differently. When they approach the feeder, they slow down. ▶



◀ Life imitating art over here. This is a California ground squirrel we call Clementine who forages from the feeders and around the yard. And who says you can't use fancy techniques in not-fancy settings? Go ahead and set up a camera trap in the backyard and let the fun begin.



MORGAN HEIM

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