

# Land Lines

QUARTERLY MAGAZINE OF THE LINCOLN INSTITUTE OF LAND POLICY

FALL/WINTER 2023



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**Coastal Marshes and Other Unsung  
Climate Heroes**

**Planners Address a Legacy of Inequity**

**How a Small City Made a Big  
Commitment to Affordability**

# Land Lines

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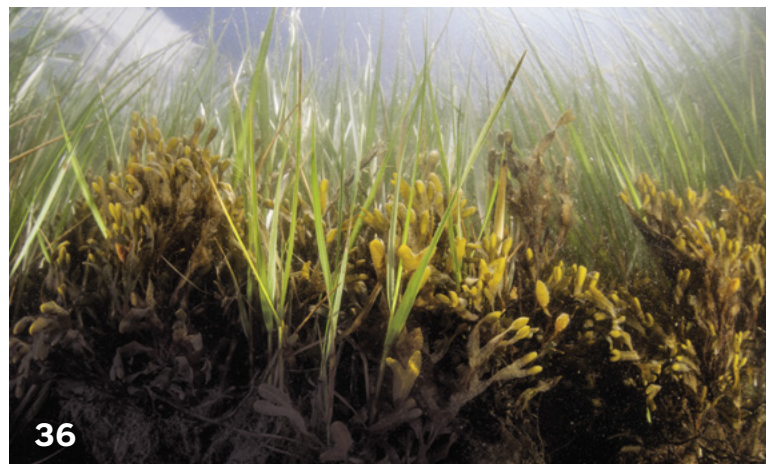
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LINCOLN INSTITUTE  
OF LAND POLICY

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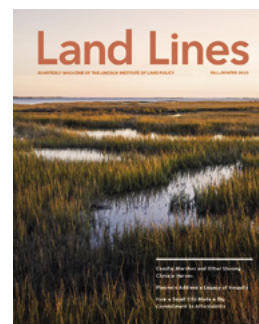
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A coastal salt marsh in Virginia. Credit: McKinneMike via iStock/Getty Images Plus.



## Defining Moments in Land Policy

**WE CAN TRACE THE ORIGINS** of the Lincoln Institute to a chance encounter between a Cleveland inventor and industrialist and a barnstorming political economist in the 1890s. John C. Lincoln, an engineer who invented arc welders, high-torque electric motors, braking systems for streetcars, and even an electric car, was deeply moved by Henry George's impassioned account of the stubbornness of urban poverty in the face of the unprecedented wealth generated by the Industrial Revolution. Lincoln subsequently devoted years of his life—and a big chunk of his fortune—to advancing George's ideas for social improvement.

George showed in a powerful and persuasive way that poverty was the result of distributive injustice. The wrong people were benefiting from economic growth. Idle landowners could sit and watch land values increase exponentially, while the productive classes, labor and capital, were taxed to support the government. George proposed replacing corporate and income taxes with a new tax that expropriated the unearned value of land from its owners. He estimated that land tax revenue would be sufficient both to eliminate poverty and to fund the government.

Given his own disposition toward social justice, ethics, efficiency, and basic fairness, this proposition resonated with John Lincoln. But the failure of George's policy prescriptions to gain any political traction mystified him.

One reason he could see was the lack of general academic embrace of George's analytics and his conclusions. Quite frankly, except for a handful of universities like Columbia, UC–Berkeley, or the University of Chicago, George's work was marginalized if it was taught at all. It was never considered a mainstream component of the training of economists or political scientists. Lincoln decided to remedy this by creating the Lincoln Foundation and partnering with universities to establish programs in land economics and taxation. And that's what the Lincoln Foundation did from 1946 until 1974.

In 1974, John's son, David C. Lincoln, took a hard look at the impact of the foundation's efforts to mainstream land economics and taxation in the fields of economics and political science. He was underwhelmed. The programs supported with the foundation's resources were evanescent and land economics remained specialized in a few universities. He decided to try a new approach and established the Lincoln Institute of Land Policy to bring research and training under our own roof. And David was clear about one thing that he often repeated: "Henry George's work was not about promoting the land tax—it was about eliminating poverty." Thus, the Lincoln Institute was founded on the notion that land policy was not an end, but a means to solve bigger economic, social, and environmental challenges.

**I asked you to submit your best definitions of land policy. I'm delighted to report that we got many submissions, from the artistic to the theological.**

With that clarity, measurable impact quickly followed. In the 1980s, the arrival of Boston lawyer and conservationist Kingsbury Browne as a Lincoln Institute fellow led to the scaling up and national networking of private land conservation in the United States. Today, members of the Land Trust Alliance, an organization that evolved from Browne's work, have protected more than 57 million acres of private land in perpetuity in the United States. In the 1990s, the Lincoln Institute invented computer-assisted mass appraisal. Systems built on that legacy are now used by local governments everywhere. In the 2000s, new international programs in Latin America supported, tested, and documented modern land value capture tools and techniques. Dozens of countries and thousands of jurisdictions are now studying ways to use these tools to mobilize their own public revenue. In the 2010s, the Lincoln Institute went global, establishing the International Land Conservation Network to promote private land conservation and sharing our work on the global stage at venues like Habitat III.

There is an important point here (and I know I buried the lede): we accomplished decades of significant work even though we could not easily define the discipline in which we operated. Over the last few years, we've been trying to rectify that. This spring, the board and management of the Lincoln Institute tried to effectively define land policy. By effectively, I mean clearly, accessibly, and efficiently. We found the task so daunting that we even consulted artificial intelligence. In my April column, I shared our challenges and asked for your help. I asked you to submit your best definitions of land policy and offered a prize.

I'm delighted to report that we got many submissions. They ranged from the artistic to the theological. They arrived from four continents, with the furthest submission coming from New Zealand. They came mainly from individuals, but included a group effort from a network of 40 practitioners in Latin America. They ranged in length from 12 to 548 words. I even submitted my own definition. If you are interested in reading all of them, you'll find them at [www.lincolninst.edu/land-policy-reader-submissions](http://www.lincolninst.edu/land-policy-reader-submissions).



Credit: Devonyu via iStock/ Getty Images Plus.

While the judges were duly impressed with the scope and creativity of the submissions, I'm afraid I have unsettling news for the Luddites among us: they did not think we outperformed the AI bot. To remind you, here is the 85-word definition offered by ChatGPT:

*Land policy refers to the rules and regulations that govern the use, ownership, and management of land. It involves making decisions about how land should be used, who should have access to it, and what activities are permitted on it. Land policy can affect a wide range of issues, from urban development and environmental conservation to property rights and social equity. Its goal is to balance the interests of different stakeholders and ensure that land is used in ways that benefit society as a whole.*

That doesn't mean, however, that accolades aren't due. In the view of the judges, the **best submission** was from Harvey Jacobs:

*Land policy is about the rules, the culture that underlies those rules, and the social expectations for the use of land. It draws together government, the market, and private actors. It has formal and informal outputs. Formal outputs are often plans, regulations, and programs. Informal outputs are often socially accepted patterns for how land is to be used and our behavior upon land.*

The **most economical submission** was a haiku written by PD Blumenthal—

*Use, control, share land  
Protect earth, water, and air  
To benefit all*

—and the **most creative submission** was a poem entitled *A More Stealthy Georgist Cat*, by David Harold Chester. It is too long to reprint here, but you can view it at the link on the previous page.

The **pithiest submission** was from Ben Brown:

*Land policy is the bundle of rules through which governments formalize wishful thinking for responding to competing demands for land use in a future that is both inevitable and uncertain.*

Even though we haven't yet outperformed artificial intelligence, I am very happy with the outcome of this exercise. It affirms a couple of important things. First, land policy has a vast scope, and it touches many aspects of life. As such, maybe it is okay that it eludes easy definition. Second, it is possible to spend years doing something that you cannot easily explain. I'm guessing land policy experts aren't the only people who cannot explain at get-togethers with their extended families what exactly they do.

It occurs to me that the problem might be taxonomical. In taxonomy, it might be harder to define a classification than it is to give an example of something in that classification. For the life of me, I can never remember the differences between class, order, family, genus, or species, but if pressed I can give an example of something in each.

In the end, **I'm going to give everyone who submitted an entry in the contest a book of their choice from our impressive and ever-expanding library of land policy publications.** In addition, I will give the authors of each of the four distinguished submissions above their choice of five books each.

It was a great exercise, and we appreciate the thought and effort put into all the submissions. We appreciate even more your collegiality, and we're honored to share this hard-to-define endeavor with all of you. What started with a chance encounter between a barnstorming reformer and an inventor more than a century ago is even more relevant today: finding answers in land to improve the quality of life. ☐



Street trees and a pop-up bike lane in Berlin, where a tech nonprofit has launched a digital platform that helps residents learn about local tree-watering needs. Credit: IGphotography via iStock/Getty Images Plus.

## Tree-Watering Apps for the Urban Canopy

AS CITIES GROW and the effects of climate change become more apparent, the importance of the urban tree has also grown. Trees provide much-needed shade, remove air pollution, absorb carbon, and even increase property values. But one element often gets overlooked: it's one thing to plant a lot of trees—but it's something else to maintain them.

For years, technology has played a role in efforts to track, map, and quantify the big-picture impacts of urban treescapes, from the environmental to the economic—a topic covered in this column in 2018. But new technologies have emerged and evolved since then, and some of the most intriguing are focused not just on high-level policy impacts but on the crucial issue of long-term maintenance. Adequate and timely watering, especially for younger trees, must be part of planning if the urban tree population is to endure. And increasingly, cities are leveraging sophisticated data tools to encourage and enable citizen engagement with urban tree maintenance.

**It's one thing to plant a lot of trees—  
but it's something else to maintain them.**

Consider a set of ongoing projects originating with CityLAB Berlin, a tech innovation nonprofit in Germany that applies data to urban problems. In recent years, Berlin—one of the more tree-rich cities in Europe—lost 20 percent of its trees thanks to high temperatures and a dearth of rain. That's partly because monitoring and maintaining individual trees can be a complicated and heavy burden for municipal governments. So in 2020, CityLAB launched *Gieß den Kiez* (Water the Neighborhood), a digital platform that made government tree data available and accessible to the public. This made it possible for citizens to learn about local tree-watering needs, and to commit to helping out. “The application was developed based on the needs of our community,” said Yannick Müller, the organization's head of strategic partnerships, via email.

The amount of available data was a revelation: government projects had previously detailed and mapped hundreds of thousands of trees. CityLAB—a project of Technologiestiftung Berlin funded by the Berlin Senate Chancellery—combined this with other data, such as rainfall figures, to create a map that cross-matches watering activity with species-specific needs for trees across the city. Feedback from a tree-engaged segment of the citizenry helped shape the platform’s development. Some people had already adopted and started maintaining particular trees. “They feel like it’s their own tree,” said CityLAB Berlin manager Julia Zimmermann. Citizens also had ideas about utilizing the city’s existing water pump system and making it more accessible.

In 2020, CityLAB launched *Gieß den Kiez* (Water the Neighborhood), a digital platform that made government tree data available and accessible to the public. This made it possible for citizens to learn about local tree-watering needs, and to commit to helping out.



Residents of Berlin use the city’s water pump system to help maintain the urban canopy. Credit: Florian Reimann.

“A chat tool enables interaction between users, groups, and initiatives and allowed us to communicate and collect feedback,” Müller explained. Aside from resolving smaller bugs, this inspired new features, like one that displays the location and status of water pumps. It also helped support the designation of “caretakers” for specific trees, who commit to monitoring and watering on a regular basis. “This small added feature allows citizens to make use of their resources in a more targeted manner,” he said.

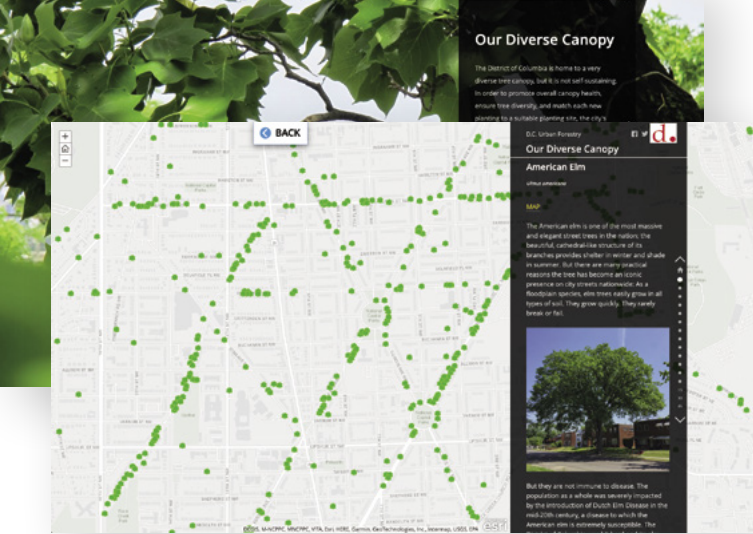
In 2021, the city of Leipzig adopted the tool, and a few more German municipalities have followed, according to Müller. User numbers are increasing continually, with more than 3,500 registered citizen caretakers watching over 7,500 adopted trees.

That said, the efforts of *Gieß den Kiez* remain an adjunct to public policy. “However, the platform succeeds in raising awareness for climate adaptations in the light of future heat waves,” Müller maintains. In Berlin, for example, “it ignited a debate between different local district authorities as to what extent citizens should be involved in taking care of city trees and if that’s a good use for water.” (It is, Müller argues, considering the costs of planting new trees and the many proven environmental and health benefits of a robust urban treescape.)

One of the inspirations CityLAB Berlin has cited is the NYC Tree Map, a digital tool with roots reaching to 2016 that now maps nearly one million trees. “The NYC Tree Map is the most comprehensive and up-to-date living tree map in the world,” the Department of Parks and Recreation declared in a 2022 press release. “Integrated directly with Parks’ forestry database, the map gives citizens the same real-time access to the urban forest that Parks Foresters have on the ground.” This enables New Yorkers to “digitally interact” with the city’s tree population across the five boroughs—for instance, they can monitor a tree’s most recent inspection, with the date and inspection ID.

“Our NYC Tree Map allows casual tree lovers to easily identify trees, flag concerns, and report





Washington, DC, residents can use the city's Tree Tool to locate trees by neighborhood—sorting them by species, age, and the care they need—and to report issues. Credit: District Department of Transportation (DDOT).

on their care,” NYC Parks Director of Stewardship Nichole Henderson said via email. “Groups and individuals log their tree care activities—like watering, litter removal, soil cultivation, and mulching—into the map.”

Several groups use the map to coordinate more ambitious stewardship and maintenance efforts. As examples, Henderson mentions the Jackson Heights Beautification Group, an arts and environmental organization in Queens; Trees New York, a longstanding professional organization that trains “citizen pruners,” among other engagement activities; and the Gowanus Canal Conservancy, whose projects include “community science” efforts such as experiments in capturing and using rainwater. And the tree map is key to NYC Parks’ own broader Let’s Green NYC campaign, which posts “citywide street tree care activities with community partners and allows volunteers to see the visible impact, how they are directly contributing to caring for the urban forest,” Henderson said.

Similar initiatives are playing out in other major cities. The District Department of Transportation (DDOT) in Washington, DC, maintains a digital tree map that encourages citizen involvement (including reporting browning leaves or insect damage, as well as trees in need of watering). The tree map launched with a special

focus on maintaining 8,200 trees planted in 2017. Elsewhere, the Adopt-A-Tree app in Athens enables citizens to take responsibility for watering individual city trees during dry summer months. And entities like CityLAB Berlin continue to innovate: its new Quantified Trees (QTrees) project aims to develop a prediction system supported by artificial intelligence, drawing on databases and sensors to identify urban trees at risk from drought. A prototype is already in testing, and launch is planned for this year.

Zimmermann, of CityLAB Berlin, concedes that it has been difficult to precisely demonstrate the impact of these efforts. “This is due to the nature of nature,” she said. Trees adapt slowly, so gauging the effects of watering programs could require years of monitoring growth and health. But the project’s data dashboard does illuminate watering patterns—and has shown that watering amounts have increased since the program started, almost certainly countering drought effects. “So the project leads at least to a better understanding and caretaking of urban green,” she said. In some cases, it has inspired local governments to support volunteers by providing material and guidelines for optimal watering practices.

“Trees are the new polar bears, the trending face of the environmental movement,” the historian and author Jill Lepore observed recently, in a survey of humans’ surprisingly long-lived appreciation for the arboreal. Now we have the science and technology to understand and quantify the value of trees beyond aesthetics. “If our ancestors found it wise and necessary to cut down fast forests, it is all the more needful that their descendants should plant trees,” landscape architect Andrew Jackson Downing wrote in 1847. “Let every man, whose soul is not a desert, plant trees.” Fair enough. But we have the obligation—and the technology—to maintain them, too. □

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**Rob Walker** is a journalist covering design, technology, and other subjects. He is the author of *The Art of Noticing*. His newsletter is at [robwalker.substack.com](http://robwalker.substack.com).



Above: Paharganj Market, New Delhi. Credit: hadynyah via iStock/Getty Images Plus. Inset: Mayor Shelly Oberoi. Credit: Office of Mayor Oberoi.

With a population of nearly 33 million and growing, Delhi is the second-largest metropolitan area in the world after Tokyo—and on track to become number one. **Shelly Oberoi**, 39, was elected mayor of the Municipal Corporation of Delhi (MCD), a governing body representing some 20 million of those people, in early 2023. Born in the capital city, Oberoi was named a vice president of the women's wing of the anti-corruption Aam Aadmi Party before becoming a ward city councilor in 2022. Oberoi, who had to run for the mayoral post several times due to parliamentary voting challenges, promised that “Delhi will be cleaned and transformed” in her tenure. She has been an assistant professor at Delhi University and Mumbai's Narsee Monjee Institute of Management Studies, and has authored several research papers on corporate social responsibility, global finance, and other topics.

**Don't miss the *Mayor's Desk* book, coming this fall! See page 48 for details.**

## A New Deal in Delhi

**ANTHONY FLINT:** *You're the first mayor in a decade to oversee all of central city Delhi, after reunification of the municipal corporation there. What kind of governing challenges and opportunities come along with that?*

**SHELLY OBEROI:** Governing the Municipal Corporation of Delhi (MCD) after its unification has come along with a fair share of challenges and opportunities. On one hand, centralization of powers allows for streamlined decision-making, enhanced accountability, and improved collaboration across departments. While centralization allows for more efficiency, it also requires careful planning to ensure equitable distribution of resources to address the diverse needs of different areas within Delhi. Balancing these needs and optimizing resource allocation is a significant challenge that we are addressing at the moment. On the other hand, unification has also offered us an opportunity for policy alignment. With a unified municipal corporation, we can now align policies and regulations across all areas of Delhi. Policy alignment allows us to address issues such as education, property tax, and new initiatives in a coordinated manner, leading to more effective civil planning and development across the city. This enables consistent implementation of rules and regulations, creating a level playing field and ensuring fairness and transparency in governance.

**AF:** You said upon being elected that you would work “to make Delhi the city that it should have been”—what does that vision look like, and what are the biggest obstacles to achieving it?

**SO:** My vision for Delhi is based upon the Aam Aadmi Party's 10 guarantees, as announced by our National Convenor and Chief Minister Arvind Kejriwal. These guarantees reflect the aspirations of the people and prioritize the overall well-being of the city. We have envisioned a clean and beautiful Delhi, free from the blight of landfills, where waste management systems are streamlined and cleanliness is promoted throughout the city. We are establishing a culture of transparency and accountability, ensuring a corruption-free Municipal Corporation of Delhi. Our vision also includes providing a permanent solution to the problem of parking through efficient management systems and addressing the issue of stray animals with compassionate and sustainable measures. Moreover, we aim to have well-maintained roads that prioritize safety and smooth traffic flow, improving the overall commuting experience for residents.

The work of the Aam Aadmi Party's state government in Delhi is already talked about globally, particularly in the fields of education and healthcare. Chief Minister Kejriwal has administered revolutions in the landscape of India's public education and public health sectors. People have started believing that government facilities can be trusted, that they can offer them the equal standard of services for free that private facilities do at exorbitant prices.

Building on this momentum, we are working with a special focus on transforming schools and hospitals into centers of excellence. We are also enhancing parks across the city, creating green spaces for citizens to enjoy. In a welcome change, we are ensuring regular salaries for workers and offering them a better environment within the MCD to promote job security and build a motivated workforce. Simplifying the process of obtaining licenses for traders,

creating a welcoming business environment, and establishing designated vending zones for street vendors are also part of our vision.

However, we acknowledge the challenges posed by rapid urbanization, budgetary constraints, stakeholder engagement, and coordination among different agencies. By recognizing these challenges and proactively addressing them, we can work toward making Delhi the city it should have always been—a thriving, inclusive, and sustainable metropolis that residents can be proud to call home and, above all, the number-one capital of the world.

By recognizing these challenges and proactively addressing them, we can work toward making Delhi the city it should have always been—a thriving, inclusive, and sustainable metropolis that residents can be proud to call home and, above all, the number-one capital of the world.



Souvenir market at Delhi's Red Fort. Credit: PRABHASROY via iStock Editorial/Getty Images Plus.

Fighting a fire at the Ghazipur landfill in 2020. Leaders are removing waste from Delhi's three landfill sites. Credit: Pradeep Gaur via iStock Editorial/Getty Images Plus.



**AF:** *Regarding air quality—brought to international attention by such documentary films as All That Breathes—what are some short-term solutions? Please also comment on your approach regarding garbage and landfills. The two issues are related, in that the new waste-to-energy plant will seemingly help solve one problem while further contributing to air pollution.*

**SO:** Air quality is indeed a pressing concern for Delhi, and addressing it requires a multifaceted approach that incorporates both short-term and long-term solutions. However, air doesn't belong to any one geographical boundary; a lot of factors that arise in our neighboring states adversely impact Delhi. Thus, the challenge needs a concerted and coordinated approach from all stakeholders, including the central government and neighboring state governments.

The Delhi government is leading an extensive effort to reduce air pollution through its Summer and Winter Action Plans. The government accordingly decides upon short- and long-term solutions as part of these action plans, be it stopping dust pollution and industrial pollution, improving on solid waste management, or

conducting real-time source apportionment studies. Under these action plans, the MCD has been delegated the responsibility of keeping a check on the factors under its domain and maintaining vigils on smaller roads under its domain. The state government regularly convenes review meetings and the MCD has extended its unconditional support to help with these efforts. It is important to also note that due to these efforts, the air pollution levels in Delhi have already seen a welcome change.

As for garbage and landfills, we are actively working upon improving the city's solid waste management system by means of promoting waste segregation, installing Fixed Compactor Transfer Stations, and shutting down neighborhood garbage dump yards. We have also set a plan to eliminate the three garbage landfills of the city. Of this we are on track to completely clear off the Okhla landfill by the end of this year and the Bhalswa landfill by the first half of next year. These targets have been set by the state as part of a dedicated approach to clean the city, and Chief Minister Kejriwal has been monitoring the daily progress to further strengthen MCD's resolve toward this mission.

**We have envisioned a clean and beautiful Delhi, free from the blight of landfills, where waste management systems are streamlined and cleanliness is promoted throughout the city.**

**AF:** *Are there any policies in the works to address the city's notorious traffic congestion? How does that fit in with your overall plan to enhance infrastructure and make the city more resilient?*

**SO:** Traffic is mostly beyond the domain of the MCD. In Delhi, the municipal body only looks after minor roads and neighborhood lanes, whose upkeep we are working upon with utmost commitment ever since taking over the reins. Along with the help of our councilors and local citizens, we are identifying all such roads and lanes that need any sort of repair and ensuring that the task is dealt with. At the larger level, the Delhi government's Public Works Department and Transport Department are doing a great job of reducing traffic congestion in the city by upgrading the existing infrastructure, building new flyovers and underpasses, and introducing electric buses.

**AF:** *The Delhi metro area—with a population of nearly 33 million and growing by nearly 3 percent per year—seems to warrant a more centralized form of governance. Is there any chance of reform to allow mayors in India to manage their cities as leaders do in major cities in other parts of the world?*

**SO:** In principle, I do recognize the need for reforms that empower city leaders to effectively manage their cities, similar to the governance models observed in major cities around the world. However, the current governance structure in India has its limitations that we respect, and we prefer to mull about within our own landscape. In theory there is always a chance for reform and exploration of alternative models. We can explore enhancing the capacity of mayors and local authorities through training programs, knowledge sharing, and collaboration with international city management institutions that can equip them with the necessary skills and expertise to effectively lead and manage their cities. We can also promote collaborative governance models that involve active participation of citizens, civil society organizations, and other stakeholders to facilitate better decision-making and ensure that the diverse interests and concerns of the city's residents are adequately represented. □

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**Anthony Flint** is a senior fellow at the Lincoln Institute of Land Policy, contributing editor to *Land Lines*, and host of the *Land Matters* podcast.



With Delhi on track to become the world's largest metropolitan area, city leaders are encouraging more active citizen participation. Credit: PRABHASROY via iStock Editorial/Getty Images Plus.

# RECKONING

How Planners  
Are Striving to  
Make Their Cities—  
and Their Profession—  
More Equitable



By Jon Gorey

**SOMETIMES COMMUNITY TRAUMA** is born of natural disasters or other unexpected events. But in America's cities, much of the pain of the past century arose from carefully planned decisions that were meticulously mapped out in advance.

New highways that splintered or destroyed Black and brown neighborhoods. Racist zoning rules that intentionally blocked people of color from homeownership. A tendency to see even thriving Black and immigrant neighborhoods as "blighted," and in need of wrecking-ball revitalization. With these and other actions, the urban planning profession contributed to the systemic racism and segregation that plague our cities. But today's planners are trying to atone for that legacy.

Dozens of urban planners around the country have signed a "Commitment to Change" statement that grew out of conversations at the 2020 Big City Planning Directors Institute, an annual conference organized by the Lincoln Institute of Land Policy that brings together top planners from America's 30 largest cities. "After the murder of George Floyd, it really crystallized that, as people who impact people's lives, invisibly and visibly, planners needed to be on the right side of history," says Eleanor Sharpe, Philadelphia's deputy director of planning and development—particularly given "the fraught history of our profession."

The resulting pledge, crafted by staffers from several cities and hosted by the City of Philadelphia, has two parts (see page 21). "One is to acknowledge the harm that our profession caused, and is still causing," Sharpe says. In Philadelphia, for example, highway construction bulldozed or bifurcated neighborhoods of color like Chinatown and Nicetown, and redlining—a practice in which lenders and others systematically denied mortgages based on race—left

The urban planning profession contributed to the systemic racism and segregation that plague our cities. But today's planners are trying to atone for that legacy.

scars by blocking access to a key source of intergenerational wealth. "Most analysis of where social issues mushroom in our city, when mapped, align with redlining maps of years past," Sharpe says. "Redlining still has a stranglehold on our city decades later."

The second part of the statement focuses on the future, committing the signatories to investments in housing, open spaces, transportation, environmental justice, and public services, among other actions, "with the goal of creating inclusive, equitable communities." The pledge also prioritizes preserving and strengthening the culture, businesses, and institutions of communities of color, and preventing displacement caused by new investments.

While the public pledge has honed planners' focus on racial equity, cities everywhere are still struggling to provide equal access to opportunity, and any progress in dismantling entrenched systems of inequality is often slow and incremental. The seeds of today's systemic racism and inequities were sown decades ago, says Jessie Grogan, associate director of Reduced Poverty and Spatial Inequality at the Lincoln Institute, "and the tools that planners have in their toolboxes also take decades . . . it's not a profession with a lot of quick fixes."

But just as the best time to plant a tree was 20 years ago, and the second-best time is now, so it is with planning a more just future. In that spirit, here are some of the ways urban planners are working to restore trust, right historical wrongs, and advance racial equity in their cities.

Top to bottom: Protesters at Philadelphia's City Hall (1968), Boston's South End (1968), Philadelphia's Chinatown (1973), and Detroit's Cobo Hall (1963). Credits (top to bottom): Courtesy of the Special Collections Center, Temple University Libraries, Philadelphia; Bill Ryerson/*The Boston Globe* via Getty Images; *Philadelphia Inquirer* Archives/Special Collections Center, Temple University Libraries, Philadelphia; *Detroit News* staff photograph/Walter P. Reuther Library, Archives of Labor and Urban Affairs, Wayne State University.

## Zoning for Equity

With the nation’s housing crisis falling hardest on low-income people and communities of color, who are more likely to experience homelessness due to the shortage of affordable housing, American Planning Association President Angela D. Brooks says reforms that lead to more housing are crucial to improving equity—in part because any conversation about equity rings hollow to someone with no place to live. “It’s something we could easily solve and fix,” she says, “and the first step is resolving to create more units of all tiers of housing, so people have a decent, safe, affordable place to live.”

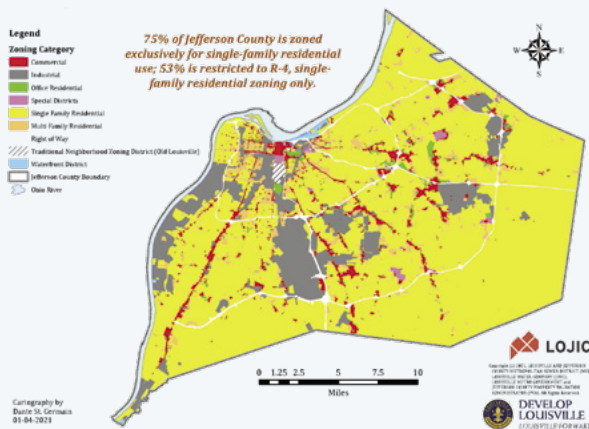
That’s one reason Emily Liu, director of the Louisville Metro Office of Planning, has been focused on updating the city’s zoning rules. In 2020, Liu and a team of volunteer planners and community members came up with 46 ways they

could improve equity in their city; six of the policies stood out as “things we could move on quickly,” Liu says.

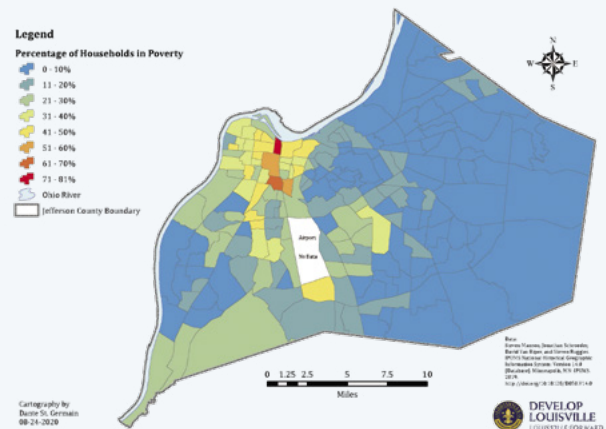
Some of those initial efforts, like allowing urban agriculture on any lot, received little or no opposition. But one proposal—allowing Louisville homeowners to build in-law apartments, or accessory dwelling units (ADUs), by right—did generate some pushback. Organizations like the American Association of Retired Persons (AARP), the Metropolitan Housing Coalition, and United Way helped produce educational materials and op-eds to counter some of the misinformation that circulated in the community, Liu says, helping to get the change passed. “This was definitely something we couldn’t do by ourselves. There was a lot of support from outside organizations and citizens.”

“The first step is resolving to create more units of all tiers of housing, so people have a decent, safe, affordable place to live.”

ZONING CLASSIFICATIONS IN LOUISVILLE METRO



POVERTY IN LOUISVILLE METRO, 2014–2018 ACS



Maps created by the Louisville Metro Office of Planning illustrate the inequitable impacts of single-family zoning, part of an in-depth exploration of discriminatory local land policies. Credit: Louisville Metro Office of Planning ([louisvilleky.gov/government/planning-design/confronting-racism-zoning](https://louisvilleky.gov/government/planning-design/confronting-racism-zoning)).





A walking tour of “missing middle” housing in Louisville, part of an effort to engage and educate the community about the need for more multifamily housing options in the city. Credit: Louisville Metro Office of Planning.

Previously, adding an ADU had required securing a conditional use permit; now, accessory units are allowed by right in Louisville, as long as they meet some basic standards, and can be rented out if the owner lives on site. “The great majority of them are approved in office by our staff, and it only takes a day or two, it’s very easy,” Liu says, noting that the city saw a tenfold increase in ADU applications in the first year after the zoning change went into effect.

Liu also managed to get front setback requirements reduced from 25 or 30 feet down to 15 feet, freeing up more space for potential ADUs. And she pushed for a small but meaningful change that will allow for duplexes on lots smaller than 5,000 square feet if they’re zoned for multifamily use. A mere 6 percent of the city is zoned for multifamily homes, Liu says, and among those lots were “10,000 parcels where, in the past, you were zoned multifamily, but you were not allowed to build even a duplex” because the lot didn’t meet the minimum size requirement.

Those are just a few examples of how small but crucial zoning changes can begin to address inequity. APA’s new *Equity in Zoning Policy Guide* is a user-friendly resource that lays out dozens more specific recommendations to help dismantle systemic inequities through three aspects of zoning: the rules themselves, the people involved in drafting them, and the ways they’re applied and enforced (APA 2023).

“It really focuses on the ways that bias and historic patterns of segregation are reinforced

through zoning,” Brooks says. “But it also offers specific ways to change drafting and public engagement, mapping, and even the enforcement of zoning regulations to dismantle barriers and expand opportunity.”

Other cities, such as Minneapolis, Portland, and Arlington, Virginia—and even some states, like California, Oregon, and Maine—have managed to pass more sweeping upzoning measures that allow for ADUs or small multifamily homes on almost any residential lot. Atlanta and Denver, among others, are also in the process of making major zoning reforms.

Liu’s department is now working to engage and educate the community around missing middle housing—conducting walking tours, for example, through Louisville’s oldest neighborhoods, to show residents how duplexes and triplexes were once abundant in the city before being zoned nearly out of existence after World War II. “The goal is to see where we can allow this by right,” Liu says, noting that such smaller, denser homes “are naturally occurring affordable housing.”

*The Equity in Zoning Policy Guide lays out dozens of specific recommendations to help dismantle systemic inequities through three aspects of zoning: the rules themselves, the people involved in drafting them, and the ways they’re applied and enforced.*



Outreach by Washington, DC, planners includes attendance at neighborhood events (left) and teen workshops (right). Credit: DC Office of Planning.

## 'Relentless' Outreach

Planning departments are also getting more active in expanding their reach beyond the older, wealthy, white male homeowners who tend to dominate public input sessions—and making a concerted push to connect with residents who have been missing from the conversation.

"A big part of it is going to where people are," says Washington, DC, Planning Director Anita Cozart—and being "relentless" about it. That means attending community festivals, block parties, and youth group meetings to seek input on any specific plans in the works, or to simply let people know how to engage with the department. "If we have a meeting and somebody says, 'I didn't know this process was happening, where's the outreach been?'" she says, "we're calling that person up, and asking them about their networks," and the best way to connect with them.

For more than a decade, Philadelphia has offered a Citizens Planning Institute, which teaches residents about the city planning process and how they can be a part of it—"and at some point, take that knowledge back to their neighborhood, and leverage it in some way that's useful to their community," Sharpe says.

The program has become so popular, staff can't keep up with demand. There are currently two cohorts a year—a spring and fall session

with 30-plus people in each—but upwards of 200 people typically apply.

"We're setting up citizens for success, we're pulling the veil down," Sharpe says, "so people can understand what's going on, and how things happen in government." The program's 700-plus alumni live all over the city and can help improve communication at neighborhood meetings. "They can act as our translators," she says. "There's a trust factor there that doesn't necessarily exist" between residents and planning officials.

Renters, meanwhile, who are more likely than homeowners to be people of color and have lower average incomes, have long been ignored in zoning or development discussions. So in Louisville, when a project involves a public meeting, the city now requires applicants to notify nearby renters, not just abutting homeowners. "Their landlord may live in California, but they're the ones who live here, who will be impacted by proposed development," Liu says.

As a renter herself, Brooks favors such efforts and says cities should pursue other channels of communication as well. "In the age of social media, there are so many ways we can get notice out to people that it is irresponsible, and just inexcusable, not to be utilizing more creative ways," she says. "Even if I owned my home and you sent me a letter, there's a high probability I won't see that until long after your meeting."

## Applying an Equity Lens

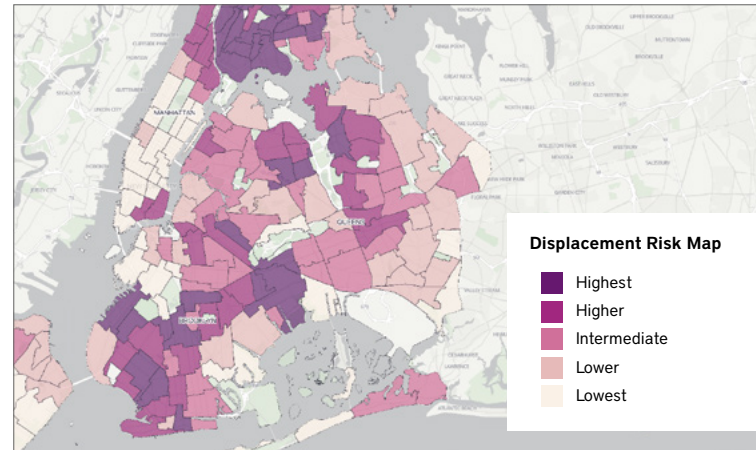
Several big cities, including New York and Washington, now require change of use or other development applications to include some form of racial equity impact report. Such an assessment injects a measure of accountability into the process that has too often been missing, based on a simple question: Will the proposed change make progress toward *advancing* racial equity, or will it *worsen* existing inequities?

Assessing the potential racial equity impacts of new development or zoning changes as part of the official planning process is a simple but important step, Grogan says. “Making sure that you think about the equity impacts of every project is a practice that doesn’t necessarily cost anything, and can add a lot of value to the day-to-day planning work,” she says.

### Assessing the potential racial equity impacts of new development or zoning changes as part of the official planning process is a simple but important step.

New York City’s Department of City Planning partnered with the Department of Housing Preservation and Development to create an interactive Equitable Data Development Explorer that maps out neighborhood-level displacement risk and disaggregated data on race, economic security, housing market pressures, health outcomes, and other key indicators (City of New York 2022). Applicants submitting a newly required racial equity report as part of their land use review must cite relevant data from the tool and include a narrative statement that explains how their project and its neighborhood context “relate to the city’s commitment to affirmatively furthering fair housing and promoting equitable access to opportunity.”

In Philadelphia, where Mayor Jim Kenney tasked all city departments with creating racial equity action plans, Sharpe says the city is trying



New York City’s Equitable Data Development Explorer includes maps of displacement risk, health outcomes, and other key indicators. Credit: NYC Department of City Planning.

to incorporate equity analysis into the capital programs budget cycle, asking agencies that receive capital funds to explain how each dollar will contribute to or dismantle systemic racism. “We’re trying to very much embed it in the culture and the philosophy of how work is approached,” she says, noting that it’s still a work in progress.

And in Washington, DC, planners use disaggregated data to assess “the benefits and burdens that might come from a change in zoning,” Cozart says, including the potential for displacement. The District’s neighborhood-level small area plans now feature a similar “Equity in Place” analysis, which can yield different priorities in different neighborhoods (City of Washington, DC). In the wealthy, majority white neighborhood of Chevy Chase, for example, the small area plan seeks to add dedicated affordable housing and remedy the area’s long history of discriminatory land use. In Congress Heights, a predominantly Black neighborhood experiencing increased redevelopment, the focus is on anti-displacement and community resilience measures.

“We ask sets of questions, but it’s a different demographic so you end up with different recommendations, different thrusts of the planning effort, even if you’re doing the same things, like disaggregating the data by race, and engaging the folks who have been marginalized from the process,” Cozart says.

## Asking Why

When San Diego Planning Director Heidi Vonblum was working on the Build Better SD initiative—an effort to support equitable, sustainable development citywide that was adopted by the city council in 2022—she interrogated longstanding policies in search of a valid reason for their existence. She and her staff would ask why something was done the way it was, and why that was, and why *that* was, and so on, until they reached a root cause. Spoiler: The origin stories of some policies more closely resembled a greedy villain’s backstory than that of a superhero.



“Sometimes it was a good idea at the time, sometimes it made sense based on information that planners had available to them,” Vonblum says. “And sometimes it was really wrong, and there’s just no need to continue that.”

That philosophy helped Vonblum’s department make a series of changes, approved by the city council in stages over the last two years.

It began with rewriting the almost 70-year-old Parks Master Plan, and challenging traditional community engagement methods that were resulting in public feedback along the lines of, “We love it, don’t change it, everything’s fine,” Vonblum says. “What was interesting about that Phase One input is that everything’s *not* fine.”

So in addition to seeking input from under-represented voices, Vonblum and a handful of staff members drove around San Diego during the pandemic and documented the starkly contrasting conditions of the city’s recreational spaces in a StoryMap called “One City, Two Realities,” to better educate neighborhood groups and other stakeholders (City of San Diego 2021). “Parts of our city have glowing, gleaming, beautiful parks, and then we have other parts of our city that have far more people—and more children and seniors, who tend to use parks the most—that have a park, but it’s got nothing to do, or it has broken playground equipment, and that’s not okay.”

“Parts of our city have glowing, gleaming, beautiful parks, and then we have other parts of our city . . . that have a park, but it’s got nothing to do, or it has broken playground equipment, and that’s not okay.”

During the pandemic, planners in San Diego documented the differences among city parks, including Clay Avenue Mini Park (top) and Carmel Mountain Ranch Community Park (bottom). Credit: San Diego Planning Department ([www.sandiego.gov/buildbettersd](http://www.sandiego.gov/buildbettersd)).



Residents across San Diego have participated in the development of a Parks Master Plan, which will help guide investments in areas with the greatest need. Credit: San Diego Planning Department.

“Progress can be slow and painful, but we’ve made so much progress just in the last couple of years. We went from having very difficult and controversial conversations to *boom, boom, boom*—actions are happening right now.”

A key aspect of Build Better SD was changing the city’s system of collecting and spending neighborhood-specific development impact fees. These one-time fees, which developers pay to defray the cost of municipal infrastructure and services associated with new development, varied drastically across the city, and had to be spent in the neighborhood where they were raised. Per-unit impact fees were up to 50 times higher in wealthy districts, discouraging denser growth in well-off areas while simultaneously concentrating reinvestment in those same places. The city has now shifted to a citywide fee structure, where impact fees are the same across every neighborhood and infrastructure investments can be prioritized for areas with the greatest need.

Some changes were unpopular at first, taking a couple of tries to get through the city council. But they have laid the groundwork for other equity-driven initiatives. “Progress can be slow

and painful, but we’ve made so much progress just in the last couple of years,” Vonblum says. “We went from having very difficult and controversial conversations to *boom, boom, boom*—actions are happening right now,” she adds. “We’re now focusing on increasing access to our coastal resources and increasing connections between communities through a citywide trails master plan,” as well as developing a master plan for a new regional park in an underserved neighborhood whose requests for green space were left on the back burner for 20 years.

As planners, Vonblum says, “we need to take an opportunity to say, ‘Okay, why do we plan for parks this way? Why do we collect development impact fees this way? Why did we prioritize infrastructure investments this way?’ Until we do that, we’re not going to be able to make any forward progress to advance equity, to advance anti-racist zoning policies, and to invest equitably in our communities.”

## Building the Planner Pipeline

At the Big City Planning Directors Institute in October 2022, Liu shared how inspired she felt by the number of other women and people of color in the room, which marked a big change from her first such conference 10 years earlier, she recalled.

But despite that encouraging shift in representation at the top, the profession is still largely white. With an eye on building a profession that better reflects the population it serves, Sharpe and other planners take every opportunity to promote planning to young people of color.

“Our staff is always eager and volunteering in high schools and middle schools, because a lot of planners heard about this later in life, and we want to say, ‘Hey, here’s a legitimate profession that you can do, especially if you want to help your neighborhood out,’” Sharpe says. “It’s feeding the pipeline, so that hopefully in 10 years, the more people hear about it, then the pipeline is not just producing mostly white people.”

Cozart and her team conduct similar efforts around Washington. “We’ve been visiting with high school students to just talk about planning and to engage them in mapping, to engage them in analyzing data that planners use, and to really think about design—the design of communities and what spaces are going to be welcoming for you,” she says.

Given the timelines of most neighborhood and comprehensive plans, those high schoolers may be the ones turning today’s recommendations into tomorrow’s more equitable urban reality.

After all, Cozart adds, given the 10- and 20-year timelines of neighborhood and comprehensive plans, those high schoolers may be the ones turning today’s recommendations into tomorrow’s more equitable urban reality. □

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**Jon Gorey** is a staff writer for the Lincoln Institute of Land Policy.



### FURTHER LISTENING

Listen to our *Land Matters* podcast about planning and structural racism with guests **Eleanor Sharpe**, deputy director of planning and development for the City of Philadelphia, and **Andrea Durbin**, former director of planning and sustainability for the City of Portland.

[www.lincolninst.edu/podcast-planners-equity](http://www.lincolninst.edu/podcast-planners-equity)

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## Statement on the Role of Planners in Contributing to Racial Inequity, and a Commitment to Change

The undersigned planning directors of United States cities acknowledge the role that city planners have played in contributing to systemic racism and segregation. We commit to working together toward an equitable future for our communities and invite all US planning directors to sign the statement and join us in this critical endeavor.

As directors of agencies that plan for the future of cities, towns, and regions, we stand in solidarity with those whose goal is to transform communities into places of opportunity for everyone. We commit to changing our practices, policies, regulations, and actions to create inclusive and diverse neighborhoods and cities that equitably meet the needs of all residents, especially Black, Indigenous, and people of color (BIPOC).

- **Whereas**, many past practices, directly or indirectly involving planning agencies and planning professionals, contributed to racial inequities in US cities.
- **Whereas**, urban redevelopment and urban renewal policies, which often designated BIPOC neighborhoods as “blighted” with the intent of revitalizing these communities through new construction, often led to wholesale clearance of these neighborhoods by eminent domain and to displaced residents with few housing choices.
- **Whereas**, physical, economic, and cultural displacement of residents, businesses, and institutions has occurred through actions such as zoning changes and development approvals that did not analyze the broad array of community needs and therefore did not address the direct and indirect impacts of these decisions.

- **Whereas**, construction of new public infrastructure, especially highways, disproportionately harmed BIPOC communities, often resulting in the destruction of entire neighborhoods and commercial districts.
- **Whereas**, cities intentionally disinvested in and neglected BIPOC communities while disproportionately creating public amenities for white residents, which deepened inequities and concentrated poverty in underserved communities.
- **Whereas**, “redlining,” the practice of geographically barring low-income BIPOC households from access to mortgages and lending, eliminated a critical source of multigenerational wealth for these communities.
- **Whereas**, racial covenants and deed restrictions in many communities blatantly prevented the sale of property to BIPOC.
- **Whereas**, exclusionary zoning practices, including the creation of single-family or other low-density districts, disallowed more affordable multifamily buildings and usually eliminated access to these neighborhoods for lower-income residents.
- **Whereas**, environmental injustices, including the siting of toxic activities in neighborhoods primarily occupied by BIPOC, exposed residents to more environmental stressors, including air and soil pollution, illegal dumping, and transportation impacts.
- **Whereas**, poor-quality public housing, combined with a lack of funding for ongoing maintenance and improvements and few on-site services, resulted in the warehousing of very poor households in segregated environments that were physically deteriorated, isolated from adjacent communities, and often unsafe.

We further recognize and acknowledge that due to the actions noted above, the impacts of the COVID-19 pandemic and other natural disasters have disproportionately affected BIPOC communities, which have experienced ongoing health, economic, and environmental stresses.

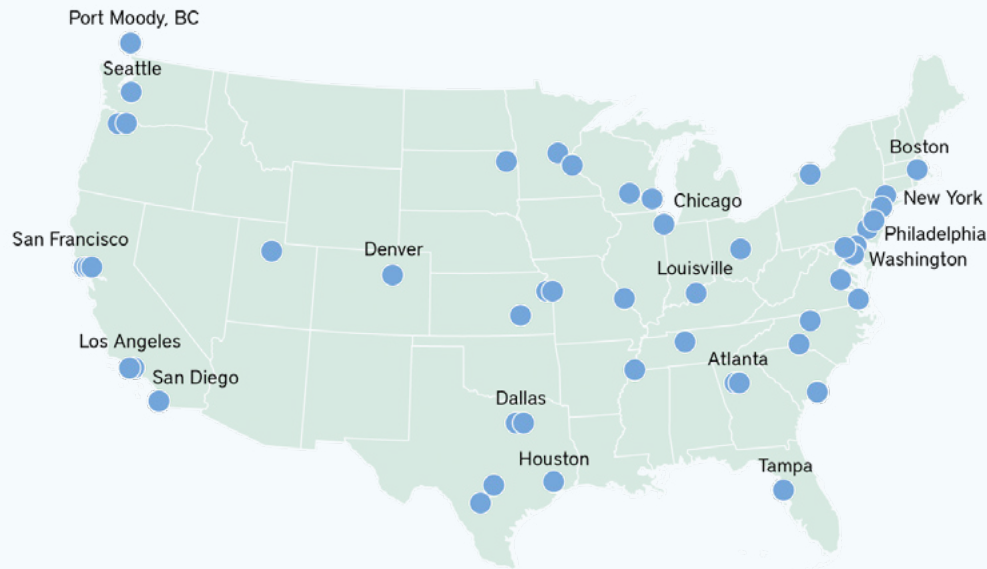
## Planning and Equity: A Commitment to Change

The planning directors hereby commit to become agents of change for our cities; to recognize that many of the following measures must be tailored uniquely to each city; to advocate for and to foster justice and equal access to opportunity; to use not only zoning and other existing planning tools but also new tools proposed by impacted and BIPOC communities to correct past harms; to achieve systemic change by rethinking public and private systems and evaluating benefits and burdens, all with the goal of creating inclusive, equitable communities, by:

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- **Creating communities that are culturally diverse, livable, and accessible** through investments in housing, open spaces, transportation, quality amenities, and public services; by reducing exposure to environmental pollution and risks associated with climate change; and by ensuring that such investments do not lead to displacement or exacerbate inequities;
- **Promoting development while addressing possible displacement**, employing specific policies and regulations that discourage economic displacement, and specifically disallowing physical displacement without comparable, high-quality replacement housing;
- **Preserving, strengthening, and celebrating the culture, assets, institutions, and businesses** of BIPOC communities, to honor their significance and prevent their erasure;
- **Championing housing choice and economically diverse neighborhoods**, including by dismantling exclusionary zoning policies and regulations, allowing diverse housing types and sizes in all neighborhoods, accommodating the needs of different family types, and providing transit and other public services for all neighborhoods;
- **Developing land use strategies that promote the health, economic, social, and cultural resilience of BIPOC communities**; establishing affordable and inclusionary housing goals that support wealth-building through asset ownership; and working to create specific policies and funding mechanisms to help realize these goals;
- **Addressing a history of environmental injustice** to BIPOC communities by cleaning up areas polluted by noxious activities, relocating such activities where possible, and creating amenities to counteract the impacts on surrounding neighborhoods;
- **Explicitly acknowledging that quality, safe housing for all, in every neighborhood, is a foundational goal of our work** and using the voices and practices enabled by our leadership roles to communicate this belief to elected officials and communities and to act on it accordingly;
- **Promoting public dialogue** about the damaging effects of structural inequity on our communities, seeking input from all residents but especially BIPOC, and advancing ideas and solutions that explicitly reflect and respect such input, using a broad array of new and existing outreach tools to include these populations in our work;





Map of signatories to the Commitment to Change statement. Credit: Philadelphia City Planning Commission.

- **Recognizing that change in our communities occurs at the speed of trust;** that is, rebuilding trust must precede other work toward change for that work to succeed; we will rebuild trust by publicly valuing and embracing the lived experiences of our communities;
- **Providing education on planning practice and policies** to underrepresented populations, and collaborating with these communities on how best to conduct these educational processes;
- **Exposing students to the planning profession, collaborating with educational institutions at all levels,** working toward a more diverse pool of practitioners in the coming years;
- **Addressing biases in the organizational culture of our agencies and creating diverse staffs** that reflect the makeup of our communities; providing opportunities in our organizations for BIPOC to obtain employment and rise to leadership positions; setting goals for these positions within specified time frames; and adopting clear policies and guidance for staff retention and career advancement;
- **Using tools such as racial equity impact assessments** to interrogate how existing and potential land use, design, and zoning policies and practices impact BIPOC communities;
- **Using data to disaggregate information by race and to better analyze qualitative measures of our communities' lived experiences** to inform policymaking and to create indicators and performance measures for tracking progress in the future.

The planning directors acknowledge that we cannot do this work alone. In addition to collaborating with affected communities, we will work with public, private, and nonprofit entities. We commit to using our voices, our practice, and our unique set of tools to achieve these partnerships, work toward these goals, and create systemic change.

To learn more, visit [www.phila.gov/departments/philadelphia-city-planning-commission/about/planning-and-equity-a-commitment-to-change](http://www.phila.gov/departments/philadelphia-city-planning-commission/about/planning-and-equity-a-commitment-to-change).

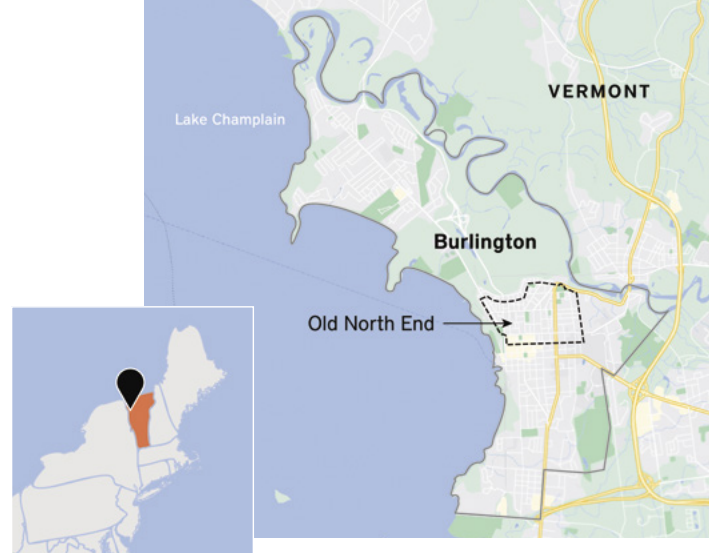
# Still the **ONE**

**Lessons from a Small City's Big Commitment  
to Neighborhood Affordability**



By Julie Campoli

This fall, the Lincoln Institute of Land Policy is releasing a video and case study about a decades-long effort to create and preserve affordable housing in the Old North End of Burlington, Vermont—a neighborhood some residents affectionately refer to as “the ONE.”



**SINCE THE EARLY 1800s**, a tight grid of streets in the north end of Burlington, Vermont, has been home to laborers, service workers, and anyone else needing an affordable place to live. The Old North End has been a place of arrival, and also permanence. Its modest apartments and small houses offer both a foothold to newcomers and the chance to stay for generations. Forty years ago, it all could have changed.

The global economic forces of the 1980s had brought the neighborhood low. Poverty and crime were rising, along with unemployment. A few years earlier, in an ill-advised urban renewal scheme, city leaders had condemned and demolished several blocks in an adjacent neighborhood, displacing its tight-knit Italian-American community. Residents and housing advocates feared the Old North End would be the next victim of large-scale redevelopment.

“Speculators were buying or optioning properties,” said Brenda Torpy, former director of housing policy for the city. They weren’t interested in building value by improving properties or nurturing businesses: “Their goal was assembling a block where they could tear everything down and make a big move.”

As the local market intensified, Old North End residents were feeling the pressure. Rents were rising as properties changed hands. No tenant protection laws were in place, and previous city administrations had shown little

interest in code enforcement. The situation was creating a sense of unease among residents—and it also created a sense of urgency for an administration led by a newly elected mayor, a young progressive named Bernie Sanders.

Many cities have addressed the problems of displacement and housing insecurity. But few have attempted such an ambitious and multi-faceted strategy over such a long period of time.

The Sanders administration wanted to prevent displacement of working-class residents. That spawned an idea that became an experiment—and eventually, through sustained effort, a reliable method for preserving and producing a critical mass of permanently affordable housing.

While housing was the centerpiece of this effort, the goal was to make life better in many other ways, offering the opportunity to thrive. The dynamic mayor and his young, talented, and tireless staff nurtured public support for universal housing security and implemented a range of programs and policies to achieve it. As the years passed, the city made streetscape improvements and invested in schools, parks, and recreation programs. Burlington’s culture of civic engagement proved fertile ground for

Preserving affordability in the Old North End—Burlington’s most densely populated neighborhood—has helped residents maintain access to good schools, green space, and a reliable social safety net. Credit: Lincoln Institute of Land Policy.



nonprofits, which emerged to provide both services—job training, health care, legal aid, recreation, child care, food relief—and emotional support to people facing many challenges beyond paying the rent.

Many cities have addressed the problems of displacement and housing insecurity. But few have attempted such an ambitious and multi-faceted strategy over such a long period of time. Leaders in Burlington took a creative approach to seemingly intractable problems. They worked at the grassroots level, relying on neighborhood organizations to communicate needs and build public support. They remained flexible, adjusting their methods to accommodate changing conditions. And they laid the foundation for a housing delivery system that would keep going for years, through changing political leadership and economic conditions.

Today, residents of the Old North End live in a city with good schools, a county unemployment rate of 1.3 percent, a wealth of green space, and a reliable social safety net. Amenities that could previously only be found in wealthier neighborhoods are now embedded within its borders. The place continues to change: many old-timers have left, and well-off newcomers have moved in. But thanks to a generous supply of subsidized housing, it continues to be a safe haven for working people and a gateway for refugees and those in need of greater opportunity.

## Identifying the Need

Children who grow up in resource-rich environments have better outcomes in life, research increasingly indicates (Opportunity Insights). Along with supportive families, children need the social and physical infrastructure found in prosperous and cohesive communities. Defined by researchers and policymakers as “high-opportunity areas,” these places offer excellent schools, community gathering spaces, job options, and vital services like public transportation, medical care, daycare, and healthy food. Their strong social networks nurture resilience and provide a cushion for life’s challenges.

Unfortunately, the people who need these places the most can’t afford to move into them. And they often can’t afford to stay in neighborhoods that are transforming into high-opportunity areas.

In booming metros, a rising tide of wealth emanating from city centers brings safer, more attractive streets and many services to long-neglected urban neighborhoods. But the tide of investment rarely brings permanently affordable housing. Rising rents push low-income residents out to the places they can afford, which offer fewer of the qualities that boost upward mobility. Income-restricted, permanently affordable housing would prevent that

displacement and, in other contexts, provide access to already prosperous neighborhoods. But only 7 percent of the 74,000 subsidized housing units in the United States are located in high-opportunity areas (Freddie Mac 2022). The rest are in under-resourced places.

When the demand for housing rises and spills into neighborhoods that have suffered from disinvestment, the early signs are not obvious. Investors buy the relatively inexpensive properties but don't immediately make improvements, putting upward pressure on the housing market without a visible sign of change. By the time the signifiers of gentrification—renovated buildings and upscale businesses—appear, market prices have risen to a level that makes preserving and producing affordable housing more challenging.

Luckily, leaders in Burlington recognized displacement risk before it was too late to prevent it at a meaningful scale. But they soon faced another question: how could they pay for the anti-displacement efforts they had in mind?

The 1980s had already brought a significant reduction in government spending as the Reagan administration slashed budgets, proclaiming that the market rather than the government would solve persistent social problems. Mayor Sanders believed otherwise, but the fiscal reality—radically reduced federal assistance programs—required an alternative approach to funding.

## Finding Funding

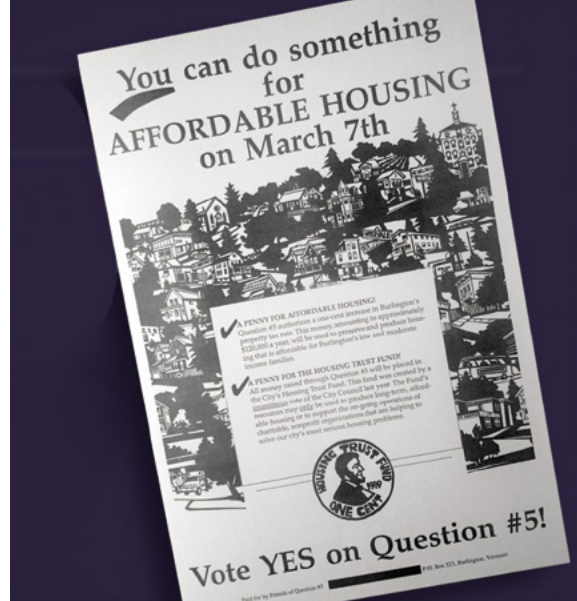
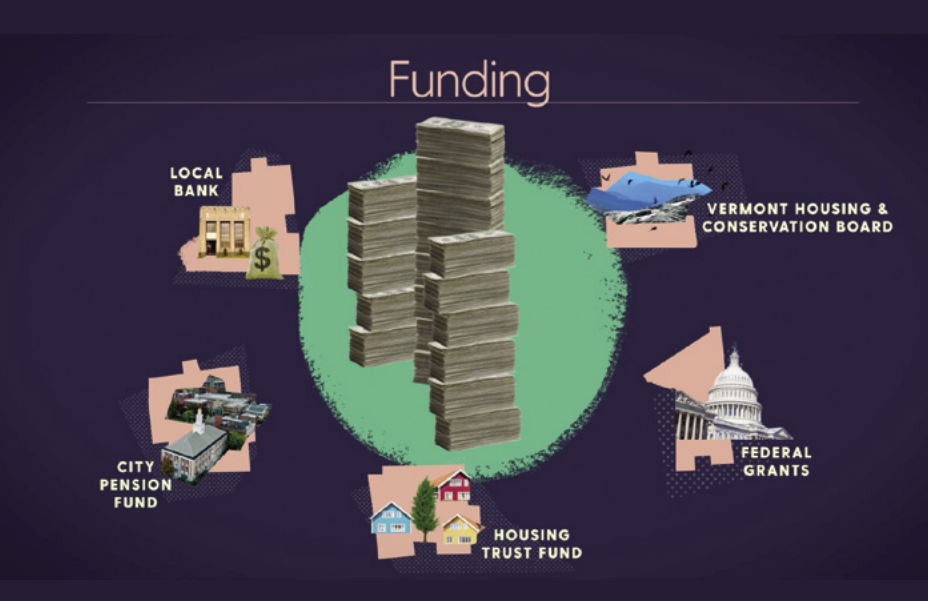
In 1984, Sanders directed \$200,000 in surplus funds to operate the newly formed Burlington Community Land Trust (BCLT), an initiative intended to expand homeownership. Two million-dollar loans from the city's employee retirement fund and a loan from a local bank got the organization's work underway. In the coming years, the city obtained funds from federal programs such as the Community Development Block Grant and HOME programs.

Many working-class residents of the Old North End secured their tenure by buying a BCLT shared-equity home. Through the community land trust (CLT) model—which was pioneered in Georgia in the 1960s and has since been adopted nationwide—individuals buy homes on land that is owned by the CLT. The homeowners agree to sell the property at a restricted price to keep it permanently affordable, but can build equity during the time they own it.

Others who weren't ready or able to own a home found affordable apartments in buildings owned by the Lake Champlain Housing Development Corporation (LCHDC). Like the BCLT, the LCHDC was created by the Sanders administration and launched as a nonprofit, but its mission was to provide rental housing. These institutions, along with many other nonprofits, programs, and policies that emerged in the



Mayor Bernie Sanders, right, with Alderman Terry Bouricius at a Burlington polling place in 1983. Sanders served as mayor from 1981 to 1989. Credit: AP Photo/Donna Light.



An innovative approach to financing (left) and popular support for policies intended to curb speculation and displacement (right) were essential elements of Burlington's affordability strategy. Credits: Lincoln Institute of Land Policy.

1980s and 1990s, were part of a multitude of efforts by officials, activists, and others to help build community and individual wealth in the Old North End.

The city's newly created Community and Economic Development Office (CEDO) orchestrated these efforts. With housing prices rising at twice the rate of incomes, CEDO's focus was on housing—more specifically, protecting the vulnerable, preserving existing affordable housing, and creating homes that low- and moderate-income people could afford. CEDO crafted a flood of renter protection ordinances that were promoted by the housing advocates at BCLT and LCHDC, and approved by an increasingly progressive city council (Davis 1990).

In 1984, the council passed a Fair Housing Ordinance to prevent renter discrimination. This was followed by a law curbing exorbitant security deposit fees. The minimum housing code, which was outdated and sparsely enforced, was overhauled in 1986. That same year, Burlington voters approved an anti-speculation tax (although it was later rejected by the legislature). This was followed in 1987 by a condominium conversion ordinance, which imposed an impact fee on developers who displaced tenants while converting rental housing to condos or cooperatives.

CEDO staffers became creative and persistent grant applicants, obtaining funds from Housing Development Action Grants, Section 8, and rental assistance programs, and cobbling together a budget to keep BCLT efforts moving until a steady stream of money emerged in the next decade. In 1989, Burlington voters agreed to a penny increase on their property tax rate, to be dedicated to affordable housing. The money would be deposited into a Housing Trust Fund and used by the city to add to the supply of permanently affordable homes.

Inspired by what was happening in Burlington, and concerned about land and housing speculation statewide, then-Governor Madeleine Kunin urged the legislature to create a state housing trust fund. In 1988, it established the Vermont Housing and Conservation Board (VHCB). Funded with a percentage of the state property transfer tax, VHCB began to disperse millions of dollars to nonprofits throughout Vermont with the combined goal of preserving both open space and affordable housing. VHCB shared the commitment to permanent affordability. In fact, the emphasis on permanence had seeped into a growing number of state laws and plans, helped along by Kunin's administration.

While BCLT needed money for its operations, it also needed to convince financial institutions to lend money to its homebuyers. At the time, the community land trust model of dual ownership was a new and untested mortgage product. It was not clear that a market for shared-equity homes existed, which made appraisers confused and lenders uneasy. BCLT pushed the Vermont Housing Finance Agency (VHFA), which was tasked with enabling homeownership for moderate- and low-income residents, to help break the logjam. An early agreement crafted by VHFA allowed banks to take both land and house in the event of a default.

BCLT accepted these terms to get things started, and over time, as it became apparent that shared-equity homes were a safe bet—there was not a single foreclosure in the first four years—VHFA and local banks became enthusiastic lenders, creating much more favorable products. By 2015, VHFA had written more than \$80 million in mortgages for land trust owners, with banks throughout the state following their lead (Torpy 2015).

## Responding to the Community

A major strength of the Burlington Community Land Trust was its ability to recognize the barriers to secure housing and improvise ways to overcome them. According to Brenda Torpy, longtime director of the organization, the question was not, “What’s the business plan?” but, “What is the need?” BCLT strove to meet the community where it was and find a way to fulfill its needs (Torpy 2015).

When it became clear that not everyone wanted or could afford a single-family house, even at a subsidized price, BCLT dove into the challenge of offering ownership to apartment-dwellers. Just as they had pioneered a model for dual ownership of single-family homes, BCLT staff sought a way to make ownership possible within the structure of a multifamily building. The likely strategy was to create a cooperative, in which residents share ownership of their apartment building, on land owned by BCLT. As with the single-family home model, their monthly payments would build equity.

Over time, as it became apparent that shared-equity homes were a safe bet—there was not a single foreclosure in the first four years—the state finance authority and local banks became enthusiastic lenders, creating much more favorable products.



The Champlain Housing Trust’s shared-equity model makes it easier for low- and moderate-income buyers to afford a home. Credit: Lincoln Institute of Land Policy.

At the time, condominiums were a new concept, and there was no enabling legislation in Vermont for limited equity cooperatives. BCLT eventually persuaded state lawmakers to make cooperatives legal. It created a handful of cooperatives in the neighborhood, but it became apparent that the model was not popular. People found the prospect of coordinating with fellow residents on the management and maintenance of a building too daunting. They preferred a responsible landlord.

Although the organization hadn't set out to act as a landlord, by the 1990s BCLT owned a growing number of rental properties, complementing the efforts of the Lake Champlain Housing Development Corporation and providing the apartments Old North End residents needed.

At the same time, it moved in another necessary direction. During the savings and loan crisis of the 1990s, banks and landlords of industrial buildings walked away from their mortgages, leaving a swath of the Old North End vacant. State environmental laws assigning liability for cleanup of brownfield sites to lenders prevented any private investment in the properties, which were decrepit and attracting criminal behavior (Torpy 2015). This was not a housing issue, but it had a direct impact on quality of life in the Old North End.

BCLT rallied local leaders and land trust supporters to lobby the legislature to remove brownfield liability laws. Then it spent the next several years redeveloping the polluted sites, returning the abandoned and blighted properties to community use, and renting spaces to nonprofits who operated a food shelf, a child-care center, and a senior center. The brownfield redevelopment also yielded a 40-unit housing cooperative and a small park. The land trust went on to develop more non-residential uses when it recognized a clear benefit to the neighborhood. Its latest project, completed in partnership with many other local organizations, was the creation of the Old North End Community Center.

## Focusing on Permanence

The Burlington Community Land Trust and Lake Champlain Housing Development Corporation merged in 2006 to form the Champlain Housing Trust (CHT). These entities were able to preserve and protect a critical mass of units in the Old North End because every property they purchased and improved would remain affordable forever. Resale restrictions protecting low-income buyers and tenants would not disappear in 15, 30, or even 50 years.

In the world of affordable housing, permanence is the exception rather than the rule. Depending on the program, federal regulations allow income-based restrictions to expire after 20 or 30 years. Many state and local jurisdictions do not require them beyond 15 years. As Low-Income Housing Tax Credit (LIHTC) projects built in the 1990s reach the end of their affordability period, rents jump to market rates, and low-income tenants face eviction, housing providers are forced to seek public money to buy or replace those properties. When affordability vanishes within a few decades, it's extremely difficult to maintain the status quo, let alone build new homes for the growing number of people burdened by housing costs.

Wanting to achieve maximum return on the taxpayers' investment in affordable housing, the Burlington City Council had stipulated in 1989 that any projects financed from the newly formed Housing Trust Fund would be affordable in perpetuity. Fiscally conservative Republicans saw the value in paying once, not repeatedly, for each affordable housing unit. In the future, BCLT would not need to dip into Housing Trust funds to purchase previously subsidized properties in

Every property they purchased and improved would remain affordable forever. Resale restrictions protecting low-income buyers and tenants would not disappear in 15, 30, or even 50 years.



order to maintain their affordability. The policy is in place at the state level as well. Every project built in Vermont using public money will stay out of the private market forever (Libby 2006).

Over the course of a decade, the concepts of housing preservation, shared equity, and permanent affordability gained public support and became normalized for local officials and state policymakers. In 1990, the city passed an inclusionary zoning ordinance requiring developers who build projects with five or more units to dedicate 15 to 20 percent of the total to rent or sell at below-market rates. The developer can subsidize those units in various ways, charging higher prices for the market-rate units, tapping state or federal funds, or partnering with a housing nonprofit. In return, the developer can make the project denser and expect some fee waivers. Between 1990 and 2019, 141 of the 551 housing units built in the Old North End were made affordable under the inclusionary zoning ordinance.

## A Culture of Support

Alongside this came a belief that investments in people—in their housing, health, and well-being—were essential. The interest in shared prosperity created fertile ground for many other nonprofits working to shelter and support low-income residents. Before the BCLT existed, Cathedral Square was building and managing affordable rental housing for seniors, and offering services like Meals on Wheels. Today, 74 of its units are located in the Old North End, where it provides senior independent living apartments, homes for adults living with mental health challenges, apartments for individuals transitioning out of homelessness, and housing for families whose parents are completing their education. The 158-year-old Howard Center, a provider of mental health, developmental disability, and substance abuse services throughout the county, partners with Cathedral Square to offer supportive group housing.



**WATCH NOW**

### Still the ONE: Preserving Affordable Housing in Burlington's Old North End

Residents of the Old North End and Burlington officials who were involved in the effort to ensure that the neighborhood remained affordable share reflections and replicable strategies in a new Lincoln Institute video.

[www.lincolninst.edu/burlington-affordability](http://www.lincolninst.edu/burlington-affordability)

Credits: Lincoln Institute of Land Policy (top); Julie Campoli (bottom).

The Committee on Temporary Shelter (COTS) was launched during the Sanders administration to serve people without homes. Today it provides 29 transitional single-resident rooms and one-bedroom apartments, a shelter for five families at three different locations, and a day station that offers hot lunches, showers, laundry facilities, workshops, job and housing counseling, and access to computers.

In 1988, the nonprofit Housing Vermont began creating rental housing through partnerships with communities and the private sector. Like BCLT, it expanded its mission in response to need, redeveloping vacant and underused historic mixed-use buildings in Vermont's downtowns, as well as providing equity investing, community development lending, and energy services. While its service area now extends to all of northern New England (as Evernorth), it still contributes to the pool of permanently affordable homes in the Old North End.

Many other organizations focus on supporting the health and safety of Old North End residents, including Feeding Chittenden, which operates a food shelf, a hot meal program, and a culinary job training program; the Community

Health Center, which provides free or sliding-scale medical and dental care; and Vermont Legal Aid, which provides free assistance to those facing eviction, discrimination, bankruptcy, and other legal problems.

Low-income residents can access low-cost transportation through Everybody Bikes and Good News Garage, which refurbish and resell donated bicycles and cars. Pathways Vermont provides peer support for mental health challenges. Outright Vermont, a statewide organization supporting LGBTQ+ youth, is based in the neighborhood. Steps to End Domestic Violence provides shelter, a crisis line, legal advocacy, and education. The Sara Holbrook Community Center has provided a safe and educational space in the Old North End since 1937 with after-school care, summer camps, a teen drop-in center, a food pantry, and other programs.

Together these policies and organizations help ensure that Old North End residents can access not only housing but also food, health care, legal and financial assistance, emotional support, enrichment, and the sense of community that will help them overcome daily challenges and improve their prospects.

The Ramble, an annual celebration of creativity and community, is a mainstay of the Old North End's vibrant cultural scene. Credit: Lincoln Institute of Land Policy.



## Putting People Before Profits

In the 1980s and 1990s, before the Old North End became attractive to outsiders, most of the housing was “naturally occurring affordable housing.” Typically this means older Class B and Class C multifamily rental properties with market-rate rents suitable for low- and moderate-income people. In the Old North End, this meant worker housing built in the previous century that was neither fancy nor up to date.

The majority of landlords were local residents who owned only a few properties (Quigley 2019). One exception was Stu McGowan, who became deeply attached to the Old North End after moving there in 1984 and wanted to help prevent displacement. As of 2019, McGowan owned 78 housing units in 31 properties in the Old North End, at a value of \$10.4 million. He could make a tidy profit by selling to the outside investors who contact him at least once a week. They have run the numbers on Burlington’s housing shortage and the Old North End’s popularity, and discovered what McGowan already knows: he could also make a lot more money by raising rents.

But he hasn’t and he won’t. He has a strict policy against it, despite leaving about \$100,000 on the table every year. His business model is highly unusual in a hot real estate market. He invests enough in his apartments to make them safe and clean—insulation, a new heating system, a fresh coat of paint—but not enough to force a substantial rent increase. Except for his large portfolio, McGowan’s ethic isn’t different from many other local landlords who invested in a few properties around their home and “took good care of them, but didn’t go overboard with any of it,” he said. “There’s a lot of conscientious landlords out there. And there’s two reasons: one, they want to do the right thing, and the other thing is, they don’t want to lose good tenants, because small landlords can’t deal with tenant turnover.”

Timing is everything. If McGowan had arrived in the Old North End 20 years later, he likely

would not have become a local landlord to 78 households. His portfolio would almost certainly be in the hands of outside investors. He might not even have been able to afford to live there himself: “We bought a duplex back in ’89,” he explains. “We paid \$130,000 for it. And it’s worth \$750,000 now. I’m not poor, but I’m not rich yet. I could not afford the mortgage on this house right now if I had to buy it.”

“I’m not poor, but I’m not rich yet. I could not afford the mortgage on this house right now if I had to buy it.”

Naturally occurring affordable housing depends on a cool market. And even when it’s owned by community-minded landlords like McGowan, it’s not permanent. It lasts only as long as the individual is committed to putting people before profits.

## Was It Enough?

The Old North End appears to be growing and changing. Census data show that the population is more racially diverse, median incomes have grown, numbers of households below the poverty line shrank, and crime levels dipped. What’s harder to gauge is whether the lower poverty levels are a result of wealthier residents moving in or current residents enjoying more economic security.

Retired city planner David White, who served in that office for over two decades, has watched the demographic trends unfold. “Many young, idealistic folks with means are moving in,” he notes. “They can afford to acquire property.”

In fact, Census data also indicate an increasing educational level among Old North End residents. In 2010, 30 percent had a college degree; by 2016, that figure was 39 percent. According to White, college graduates are drawn



In recent years, affordable and inclusionary housing projects have included the Bright Street Co-op, a 40-unit complex built on a former brownfield (left), and infill development on Elmwood Avenue (right). Credits (l-r): Courtesy of Champlain Housing Trust, Julie Campoli.

to the neighborhood by the eclectic businesses and culture built by immigrants from Vietnam, Africa, Nepal, and other places, with both groups taking advantage of the opportunity they are finding in the neighborhood.

Has the decades-long effort to prevent displacement succeeded? Plenty of anecdotal evidence suggests that people are finding it more expensive to live there, but there's no data indicating how many residents moved out because they were evicted or their rent was too high. Households relocate for many reasons other than financial, such as a change in family circumstance or a job opportunity. Because there is no authority systematically recording those reasons, it's impossible to confirm whether the changing population is a result of displacement or choice.

What's clear is that over 480 households in or next to the Old North End now have a vastly reduced risk of being forced out. If they rent an apartment owned by the Champlain Housing Trust, Cathedral Square, the Burlington Housing Authority, or Evernorth, their monthly rents are tied to their income. If they live in a shared-equity

home, their odds of staying put or moving to a more expensive market-rate home are good.

Champlain Housing Trust has evaluated how well it is meeting its goal of generating community and individual wealth. A 2003 study concluded that while the sellers of land trust homes earned less profit than they might with an unrestricted, market-rate home, it's considerably better than the most likely alternative of renting, which yields no returns. Between 1988 and 2003, home sellers enjoyed an annualized rate of return of about 17 percent, recouping their original down payment and then realizing a net gain in equity.

A more recent study, looking at sales of 150 homes between 2016 and 2020, found the average equity gain to be \$38,300. CHT has also found that shared-equity homeownership provides a bridge between renting and owning a market-rate home. Sixty-eight percent of those selling a shared-equity home buy their next home on the open market. The equity they've earned allows them to enter a market that was not available to them earlier, and offers the buyer of their land trust home the same.

Brian Pine has observed change in the Old North End from several perspectives. He joined the Community Economic Development Office fresh out of college in the 1980s, worked on housing issues there for decades, led a statewide affordable housing advocacy organization, represented the neighborhood as a city councilor, and is now the director of CEDO. He has watched

**What's clear is that over 480 households in or next to the Old North End now have a vastly reduced risk of being forced out.**

his neighbors who bought land trust homes in the 1980s thrive, and he believes the high percentage of permanently affordable housing helped working-class residents remain if they chose to.

But for low- and moderate-income residents who do not already live in a permanently affordable home, the risk of displacement is higher. By 2000, the Burlington Community Land Trust had slowed its acquisition of properties in the Old North End as it expanded its reach into other neighborhoods. Its merger with the Lake Champlain Housing Development Corporation in 2005 brought an even greater geographic and programmatic scope. It now houses over 2,500 families in rental apartments and group homes throughout the three counties of northwestern Vermont. In the past few years, it has initiated projects to build an additional 560 units. Fifty-two families bought a land trust home in 2022 and others received no- or low-interest loans from CHT to make improvements to manufactured and farm labor housing.

Although the land trust continues to steward its properties in the Old North End, it is not producing new affordable housing there. The business model that worked for nonprofits in past decades doesn't make sense with higher real estate prices and a shortage of buildable parcels. Despite the relatively high percentage of affordable units, there is not nearly enough. It's still possible to move into a CHT apartment, but the waitlists are long and it takes approximately 15 months to get one.

So the answer to "has it been enough?" depends on who you talk to. The neighborhood is facing a housing shortage within a hot real estate market, gentrification is occurring, and basic housing and economic needs are still great (Jickling 2018). But the efforts that unfolded over decades made a huge difference for many individual people, transformed a neighborhood culture, and influenced the way local residents, city leaders, and state policy-makers view their responsibilities related to displacement and affordability. □

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# NATURE'S TOOLS

**Salt Marshes, Fungi, and Other  
Unsung Climate Heroes**



*By Jon Gorey*

**CLIMATE CHANGE IS NO LONGER KNOCKING**—it kicked down the door this summer. Wildfires destroyed more than 33 million acres of forest in Canada’s worst-ever fire season. Vermont was flooded by a 100-year storm for the second time in 12 years, while a different deluge left five dead outside of Philadelphia. Temperatures in Phoenix crested 110 degrees Fahrenheit for 31 consecutive days, failing to dip below 90 degrees at any time for more than two straight weeks. And as deadly bouts of flood, fire, and ferocious heat erupted all over the planet, we lived through the hottest day in recorded history—a global record that was promptly broken the very next day, and again the next—in what scientists say was likely the hottest month on Earth in 120,000 years.

Given the urgency of the climate crisis, every workable solution to limit further warming and to transition our economies off of fossil fuels deserves exploration. This dire situation demands technological advances, of course; indeed, technology has alleviated so much human suffering, it’s tempting to heave all our hopes squarely upon its back, like desperate sports fans expectantly looking to their team’s star player to pull off just one more spectacular play as the clock runs out.

But we can’t overlook the importance of allowing and encouraging nature to heal its own ecosystems as part of our climate strategy.

Trees are often touted for the many small miracles they provide, especially in urban areas, as they cool streets, clean air, and reduce storm runoff while pulling carbon dioxide from the atmosphere. But how many people know that microscopic forest fungi process twice as much carbon as the United States emits each year? Or that a salt marsh can sequester 10 times as much carbon per acre as a forest? Or that restoring even a small fraction of bison populations across parts of the American prairie could help those grasslands absorb more carbon than all of Great Britain emits in a year?

Salt marsh, Cape Cod, Massachusetts. Credit: Ken Weidemann via iStock/Getty Images Plus.

These are not miracle cures for the climate crisis, of course; none of these tools will slow climate change on its own without a dramatic reduction of fossil fuel use. But all are surprisingly powerful, relatively simple, and low-risk strategies we could be using more often, in more places. After all, both an expensive cordless drill and a five-dollar screwdriver can help you build something—but only if you get to work using them.

## Marsh Magic


Hundreds of millions of people around the world live near a salt marsh, or a similar coastal ecosystem of mangroves or seagrass. These seaside sanctuaries offer quiet beauty and attract abundant wildlife; they also absorb floodwater and wave energy during storms, reducing damage to adjacent communities by up to 20 percent. But many people don't realize that

these unassuming tidal wetlands are also busy trapping carbon at an *astounding* rate—10 to 40 times faster than a forest.

There are two reasons salt marshes, mangroves, and seagrass beds are such powerful carbon sinks. One is that their vegetation grows very quickly, says Hilary Stevens, coastal resilience manager at Restore America's Estuaries (RAE). "There's a lot of photosynthesis, a lot of pulling of carbon dioxide out of the atmosphere," she explains.

But the real magic of the marsh is its salty, soggy soil. When that vegetation dies, it falls to the bottom of the marsh and gets buried in a network of roots and sediment, where it will remain indefinitely saturated with briny water. That anaerobic environment slows or even stops the decomposition process, allowing the carbon in the plants to stay stashed in the soil for hundreds or even thousands of years. This underwater vault is known as "blue carbon."

The salty, soggy soil of coastal marshes can store carbon for thousands of years. Credit: Velvetfish via iStock/Getty Images Plus.



Many people don't realize that these unassuming tidal wetlands are also busy trapping carbon at an *astounding* rate—10 to 40 times faster than a forest.





Residential development near a salt marsh in Massachusetts. Credit: Ken Wiedemann via iStock/Getty Images Plus.

## Salt marshes can sometimes migrate upland as seas encroach, but only if there's room to do so, and the walls and roads of human development often make that impossible.

While forests are also excellent at trapping carbon, Stevens says, they're more likely to release it, through events ranging from wildfire to decomposition. But the carbon in marsh soil "can remain there for centuries if that area remains inundated and undisturbed."

Of course, that's a big "if" when there are humans around. The United States alone loses an estimated 80,000 acres of coastal wetlands each year due to a combination of development and sea-level rise. Even many surviving marshes have been ditched and drained over the years, allowing air to reach the long-submerged soil, and turning powerful carbon sinks into leaky CO<sub>2</sub> emitters.

"If you disturb an inundated soil, if you allow it to drain—whether that's because you filled it, ditched it, diked it, drained it, converted it to agriculture, or paved it and put up a parking lot—all of that organic material is at risk of being rereleased into the atmosphere," Stevens says. Centuries' worth of carbon can then escape fairly quickly, so preventing further loss of healthy coastal wetlands is critical from a climate standpoint.

That's a growing challenge as ocean levels rise more quickly. Salt marshes can sometimes migrate upland as rising seas encroach, says Cynthia Dittbrenner, director of coastal and natural resources at Massachusetts-based conservation organization The Trustees—but only if there's room to do so, and the walls and

roads of human development often make that impossible. And although they're actually quite good at adapting to *slowly* rising seas—because a healthy salt marsh naturally builds in elevation each year as its grasses die off and accumulate on the bottom and daily tidal inflows deliver new sediment—scientists fear that natural process of accretion can't keep up with the unnatural and accelerating rate of sea-level rise driven by human-caused climate change.

What's more, a lot of our remaining marshes aren't particularly healthy.

In New England, for example, colonial farmers viewed salt marshes as a source of hay for livestock and horses, and set about draining them to ease harvesting. To this day, most of the region's marshes are still ribboned with man-made ditches dug hundreds of years ago. Later, the long-neglected ditches clogged, creating pools of standing water that prompted 20th-century mosquito-prevention squads to dig them out once again. But a drained marsh doesn't build elevation as it should; in fact, it sinks, because the organic matter in the soil starts decomposing more rapidly as it interacts with the air.

"A legacy of 300 years of us ditching the marsh has led to lowering the water table, and that marsh soil is now being exposed to oxygen," Dittbrenner says. "It's aerated, it's decomposing quickly, and it's actually sinking . . . so we have to heal the hydrology to fix that natural process."

There are simple and cost-effective ways to restore ditch-drained salt marshes. One method, piloted by the US Fish and Wildlife Service, is to cut marsh grass along the edge of a ditch, rake the hay into the trench, and secure it to the bottom with twine and stakes. “When the tides come in, that hay slows the water down and encourages sediment to drop out,” Dittbrenner says, and that slowly refills the ditch. “If you do that over a series of three to four years, you’ve filled the ditch up, and now it can grow salt marsh hay,” and tidewater lingers longer as it naturally would.

The Trustees implemented that technique on 85 acres it manages in the Great Marsh north of Boston, and the results were so promising that the organization secured funding—and hard-won permits—to expand the restoration effort across 1,274 acres. The project includes land owned by The Trustees, a local land trust, and the state.

Another opportunity for marsh restoration is in places where a road or bridge has cut off part of a marsh from incoming seawater. “The area upstream of that essentially becomes freshwater, because it’s not getting enough tidal influence,” Stevens says. Soil inundated with freshwater is

still slow to release carbon dioxide, she notes, but it does emit a lot of methane—a much more potent greenhouse gas—because it hosts a set of microbes not found in brackish or saltwater. “If you can restore tidal flow to those areas, there’s a massive carbon benefit to that.”

One such effort underway is the Herring River Restoration Project in Wellfleet, Massachusetts, where a dike built in 1909 cut off tidal flow to what had been a stable estuary for 2,000 years. A new bridge with large tide gates will allow ocean water to return—gradually, at first—along with herring and other fish, tidal sediment, and native saltwater seagrasses. The project will return 677 acres of freshwater wetland to salt marsh, which the US Geological Survey calculates will reduce emissions by an equivalent of 2,721 metric tons of carbon per year (NPS 2023).

With less room to migrate, smaller, narrow “fringe” marshes are more at risk from rising seas. But they can “attenuate quite a bit of wave energy,” Dittbrenner says, making them useful storm defenses for coastal communities, and they can be protected—or even created—with simple, natural methods. Installing coir



The Trustees, a conservation group in Massachusetts, is working to restore 1,274 acres of the Great Marsh north of Boston. The map at left shows the location of ditches, embankments, tidal channels, and tidal blockages; the work includes remediating agricultural ditches like the one below. Credit: The Trustees.





The Herring River Restoration Project in Wellfleet, Massachusetts, will return 677 acres of freshwater wetland to salt marsh by installing a new bridge with tide gates (left); the work has included collecting soil samples to analyze sediments, which can reveal information about the marsh's age and health (right). Credits (l-r): USGS Photo/Sara Ernst, NPS Photo/Kristina Vinduska.

logs (made of coconut husk fiber) or mesh bags stuffed with oyster shells a few meters offshore, for example, can help protect and grow the marsh behind it. “It slows the wave energy so much that it allows sediment to build up,” she says, until grass can grow on it. In one project, Dittbrenner says, researchers were able to extend a stretch of fringe marsh 10 feet further into the water in under a year using old lobster traps to slow the waves and capture sediment.

Stevens is now working on a project in the Gulf Coast that uses recycled oyster shells from restaurants to build artificial reefs, creating new habitat for live oysters. In addition to increasing food security for the community (oysters, she notes, are one of the most climate-friendly ways to grow protein, requiring no irrigation, fertilizer, or feed), the reefs create a breakwater to stabilize the shoreline and protect adjacent communities.

But halting the continued loss of coastal wetlands would have the biggest climate impact of all. “We would love to see better protection for existing blue carbon ecosystems,” Stevens says, along with a more coordinated government approach—two pillars of Restore America’s Estuaries’ Blue Carbon National Action Plan (RAE 2022).

At the same time, Stevens says, there’s a need for permitting reform, so groups like RAE and The Trustees can more easily restore degraded marshes; it can be difficult to reuse dredged sediment, for example, even though it’s a key ingredient to help sinking marshes. “Some of those regulations, because of the way they’re worded, actually inhibit restoration, because they make it so difficult to operate in the coastal zone,” she says. Such rules were put in place with the best of intentions, she adds, but that was decades ago. “And we’ve learned a lot since then.”

“We would love to see better protection for existing blue carbon ecosystems.”

## Forest-Feeding Fungi

Neither plant nor animal (though more closely related to the latter), fungi are their own biological kingdom, comprising about 3.5 million different species. Microscopic fungi are everywhere—all over our bodies, on plants, in the air we breathe—and without them, says Jennifer Bhatnagar, associate professor of biology at Boston University, most of the biological processes on Earth would cease. They're especially important in forests.

“One of the main roles of those fungi in forests is to decompose dead plant leaves, roots, and other plant parts, and other dead microorganisms, and most of that activity happens in the soil,” she says. In doing so, they release elements like nitrogen, phosphorus, and sulfur back into the soil in a form that plants can use.

But there's a group that's particularly crucial to forest health: mycorrhizal fungi, which live on

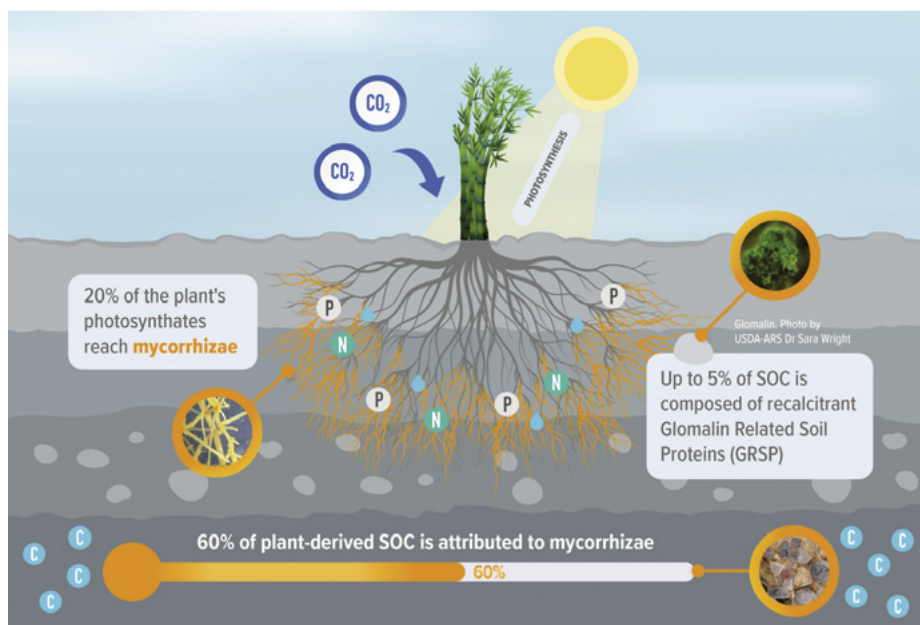
the roots of plants in one of the oldest symbiotic relationships found in nature.

When a mycorrhizal fungus colonizes a plant by growing on or inside its root cells, the plant will send up to 30 percent of its carbon—in the form of sugar, produced through photosynthesis—from its leaves down to its roots to feed the fungus. To return the favor, “the fungus will use that carbon to extend out into the soil and absorb those nutrients that are being decomposed by other fungi,” Bhatnagar says, and give them to the plant. The carbon ends up feeding not just the fungus, but also nearby microbes, which help sequester it in the soil.

“This is the main way that plant carbon gets from above ground to below ground on the surface of the earth,” Bhatnagar says. “It's a really important way that we're able to take carbon out of the atmosphere and put it into the earth—and it can remain there for quite a long time.”

When a mycorrhizal fungus colonizes a plant by growing on or inside its root cells, the plant will send up to 30 percent of its carbon—in the form of sugar, produced through photosynthesis—from its leaves down to its roots.

Mycorrhizal fungi allow plants to absorb more nutrients like phosphorus and nitrogen and help build carbon levels in soil (noted here as SOC, or soil organic carbon).  
Credit: Groundwork BioAg (groundworkbioag.com).





Researchers at the University of Florida and West Virginia University amassed the world's largest collection of arbuscular mycorrhizal fungi. The collection is being transferred to new curators at the University of Kansas. Credit: WVU Photo/Brian Persinger.

A study published in June estimated that an astounding 13.12 gigatons of carbon fixed by plants each year is allocated to mycorrhizal fungi, at least temporarily (Hawkins et al. 2023). It's not yet known how much of that carbon is retained in the soil long-term, but even half of that would represent more than the annual carbon-equivalent emissions of the United States—and the researchers suggested that fungi could be essential to reaching net zero.

Mycorrhizal fungi networks can help boost a forest's carbon intake above ground as well. Ecologist Colin Averill, lead scientist at ETH Zurich's Crowther Lab and the founder of the carbon removal start-up Funga, says it's helpful to think about the microbial environment of soil the way we conceive of the human gut biome. "Each of us has this incredibly biodiverse community of bacteria in our gut, and this has profound implications for our health," Averill says—and a forest is no different.

To learn what a healthy forest microbiome looks like, he and his team compared soil samples from hundreds of locations across Europe where foresters had been tracking trees for decades. They found that the mix of fungi living on the tree roots in the sampled forests was linked to a threefold variation in how fast the trees grew. Put another way, Averill says, "You could have two pine forests in Central Europe sitting side by side, experiencing the same climate, growing in the same soils. But if one of them has the right community of fungi on its roots, it can be growing up to three times as fast as that adjacent forest," and removing more carbon from the atmosphere.

"Basically what we're learning is that there's something special about wild microbiology that can be lost, and it can have this enormous effect if you reintroduce it."

This can have a particularly profound impact on the reforestation of former agricultural land or other degraded landscapes, where, after decades of farming, grazing, or mining, Averill says, “The microbes that live in that soil no longer look anything like the microbes in a forest.”

Averill partnered with a nonprofit in Wales that was reforesting an abandoned sheep pasture to conduct an experiment, adding a handful of soil from a healthy forest to some of the saplings as they were planted. “It’s a very low-tech procedure,” he says. “But it’s not just any dirt. It’s dirt from a forest that our analyses identified as harboring intact wild, biodiverse, high-performing fungal communities. And the early results there show we can accelerate forest regeneration by 30 to 70 percent if we co-reintroduce the below-ground microbiology.”

Similar experiments around the world that introduced healthy microbial networks to degraded forest or grassland soil have shown a 64 percent average increase in biomass growth, Averill says—though the results vary widely. “Some places are unresponsive, some are incredibly responsive,” he says. “But basically what we’re learning is that there’s something special about wild microbiology that can be lost, and it can have this enormous effect if you reintroduce it.”

## Letting Wildlife Go Wild

For another way to accelerate forest growth and carbon uptake, we turn to a different biological kingdom: animalia. A 2023 study led by Yale ecology professor Oswald J. Schmitz found that protecting and restoring populations of animal species can supercharge the carbon capture capabilities of their respective ecosystems (Schmitz et al. 2023). This can enhance the total amount of CO<sub>2</sub> naturally absorbed and stored by as much as 6.41 gigatons per year worldwide—or more than 14 trillion pounds of CO<sub>2</sub>.

“People assume that because animals are rare in ecosystems, they don’t matter to ecosystem functioning,” Schmitz says. But the idea of “trophic cascades”—in which predators, by preying on herbivores, have a ripple effect on vegetation—made him think otherwise. “If predators can have a profound effect on plants, and we know herbivores can have a profound effect on plants, then surely they should also have an effect on carbon cycling and nutrient cycling.”

They do, and the carbon impact of healthy wildlife populations can be tremendous in all kinds of ecosystems.

Endangered forest elephants in Central Africa, for example, spread the seeds of trees



Left: A researcher takes a soil sample to analyze mycorrhizal fungi communities in Wales. Right: Mycorrhizal fungi on a grass root, magnified 700 times by an electron microscope. Credits (l–r): The Carbon Community, Eye of Science/Science Source.



A forest elephant in UNESCO's Dzanga-Sangha Special Reserve, Central African Republic. Credit: mauritius images GmbH/Alamy Stock Photo.

Endangered forest elephants in Central Africa, for example, spread the seeds of trees and woody plants, and trample and devour vegetative undergrowth, helping carbon-dense overstory trees grow faster and bigger.

and woody plants, and trample and devour vegetative undergrowth, helping carbon-dense overstory trees grow faster and bigger. Restoring wild elephant populations within the region's 79 national parks and protected areas—about 537,000 square kilometers of tropical rainforest—could help capture an estimated 13 megatons of additional CO<sub>2</sub> per year, or 13 million metric tons.

In the ocean, migrating marine fish eat algae near the surface, and their fecal matter drops to the ocean floor or nourishes photosynthesizing phytoplankton. Fish also help the ocean lock up carbon as they rid their bodies of excess salt through the production of calcite, a form of calcium carbonate. “Calcite is a way of binding up salt,” Schmitz says, “but it's also a carbon-based unit.” The hard pellets sink to the ocean bottom, and don't break down easily. Marine fish help the oceans absorb 5.5 gigatons of CO<sub>2</sub>

annually—without getting explicit credit for it—and Schmitz says overharvesting fish or catching them in deeper waters could jeopardize that enormous underwater carbon vault.

Predators like sea otters, meanwhile, help carbon-absorbent kelp forests thrive by keeping seaweed-munching sea urchins in check. Gray wolves and sharks create similar trophic cascades in boreal forests and coral reefs, where they keep the populations of their smaller herbaceous prey in balance.

In the Arctic, organic matter in the ground doesn't decay and release methane as long as the permafrost stays frozen. Caribou and muskoxen help ensure that by trampling the snowpack, creating a cold crust of compressed snow that forms an insulative barrier over the permafrost. Meanwhile, just by eating and trampling shrubs, they help the snow reflect more solar radiation.



Sea otters in the Pacific (left), caribou in the Arctic (right), and bison in the Badlands (facing page) all play a critical role in helping ecosystems store carbon. Credits (l-r): Delpixart via iStock/Getty Images Plus, longtaildog via iStock/Getty Images Plus, franckreporter via E+/Getty Images.

“If the animals aren’t there, the shrubs grow above the snowpack level, the sun shines on the vegetation, and, especially in the spring, that vegetation holds the solar radiation,” Schmitz says. “It doesn’t reflect it the way snow would, and it warms up the soil a lot faster.”

And in North America, where white settlers all but wiped out the more than 30 million bison that once roamed the prairies, just 2 percent of that animal’s onetime numbers remain, confined to about 1 percent of its historical range. Because heavy herds of grazing bison help grasslands retain carbon in the soil, restoring their numbers across even a small fraction of the landscape—less than 16 percent of a handful of prairies where human conflict would be minimal—could help those ecosystems store an additional 595 megatons of CO<sub>2</sub> annually, the study found.

That’s more than 10 percent of all the CO<sub>2</sub> emitted by the United States in 2021. “We could restore up to 2 million bison in parts of the prairie states where they’re going to have very little conflict with people, and in doing that, you will be able to take up enough carbon to offset all of the prairie states’ fossil fuel emissions,” Schmitz explains.

These findings could have a meaningful impact on land and marine conservation efforts, says Jim Levitt, director of the International Land Conservation Network (ILCN) at the Lincoln Institute. “This is not your everyday piece of natural climate solution research,” says Levitt, who was not involved in the study. “I think this is a major insight.”

For one thing, it points to the need for larger, more interconnected wild spaces. “It’s not just land protection, it’s also stewardship across big corridors, large landscape conservation,” Levitt says. Animals need huge swaths of functionally intact ecosystems to recover their historical numbers and species diversity, but they can rebound rapidly given the right conditions.

“If you give nature a chance to reestablish itself, it’s really efficient at doing so,” Levitt says, noting that many US National Forests were once abandoned lands denuded of their timber. Now those swaths of forest are essential tools for absorbing atmospheric carbon.

“Not only do the trees sequester carbon, but the soil, the animals, the insect life, and the mycorrhizal networks under the ground, they’re all sequestering carbon, and they all depend on a healthy chain of trophic networks,” Levitt says.

“This is not your everyday piece of natural climate solution research.”



“So there is utility, even related to the survival of our species, in having wild animals on open space. It’s not just beautiful, it keeps the carbon cycle in tune.”

As a resource hub connecting private and civic conservation groups across cultural and political boundaries, ILCN has an important role to play in supporting the establishment of the type of linked, protected environments that promote greater biodiversity, Levitt says. “You really need large, interconnected, protected spaces to get to truly rich ecosystems,” he notes. “And what networks can do is make land conservation contagious sociologically—meaning, if your next-door neighbor has conserved his property, you’re more likely to do the same thing.” ILCN also supports the global 30x30 effort, an agreement among more than 190 countries to work toward protecting 30 percent of the world’s land and oceans by 2030.

With that ambitious global conservation goal in mind, Schmitz contends that the study demands a shift in perspective, and an embrace of more dynamic landscapes. “We can’t just do it in parks and protected areas, there just isn’t enough [protected space],” Schmitz says. “So we actually have to think about working landscapes.”

And that’s where human-wildlife conflict can occur, as wild animals trample crops, for example. To ease that tension, Schmitz suggests paying landowners for lost livelihoods as well as for the carbon they’re offsetting. “If we’re going to ask people to live with these animals, we should at least compensate them . . . but also we should inspire them to think differently about being stewards of their lands,” he adds. “Instead of having cattle ranchers in the western prairies, maybe there are some people who’d think of themselves better as carbon ranchers, who are willing to bring bison back, and we should actually pay them for the service that provides.” □

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