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From the Ground Up

How Land Trusts and Conservancies Are Providing Solutions to Climate Change

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Executive Summary

Wild blue indigo in the Flint Hills region of Kansas. Photo: Brad Mangas

This Policy Focus Report presents a dozen case studies that demonstrate how land trusts, conservancies, and other nongovernmental civic organizations have meaningfully addressed climate change over the past several decades. These organizations are working to protect land, biodiversity, and historic resources in more than 100 countries on six continents. They work in partnership with public agencies as well as private companies, other nonprofits, colleges and universities, and Indigenous communities. They offer largely nature-based solutions that are conceptually creative, measurably effective, strategically significant, transferable, and potentially enduring. These civic sector entities often add continuity to projects that may take decades to fully implement, especially as political leadership and attention can fluctuate dramatically from year to year.

The long-predicted disruptive impacts of human-induced climate change are now upon us, often with disastrous consequences. In Canada, record-breaking summer temperatures related to climate change (World Weather Attribution 2021) have set the stage for unprecedented forest fires, such as the one that consumed 90 percent of Lytton, British Columbia, in one day in 2021 (Isai 2021). Heat-related human deaths in the region tripled compared with previous years. In Australia, heat waves in the state of New South Wales since 2017 have led to power plant failures and forced authorities to urgently cut demand (Knaus 2017). In China, millions of people living along the Yangtze River risk landslides and inundations due to increasingly intense storms such as those reported in July 2020 that caused economic damages exceeding USD $8 billion (Stanway 2020).

No single sector of the economy—public, private, or civic—has the resources, will, or tools to confront climate change alone. Droughts, floods, wildfires, water scarcity, extreme temperatures, intense storms, energy sprawl, falling agricultural productivity, an epochal decline in biodiversity, and other related issues require cross-sector solutions. As a parade of public figures have reiterated—from U.S. President Joe Biden to World Bank economists Stéphane Hallegate and Julie Rozenberg—this global crisis requires "all hands on deck" (Hallegate 2019, Ritter 2021).

This report illustrates the capacity and determination of land conservation groups working across large areas and long periods of time. It also recommends how practitioners, funders, and decision makers can enhance and accelerate civic organizations' efforts to address daunting challenges in the age of climate change.

Consider one example of the many offered in this report. Rocco Buchta was born in 1965 in the East German town of Strohdehne, near Berlin. As a boy, he spent long, happy hours outdoors fishing with his grandfather, who was born in 1904. His grandfather told the boy how green and full of wildlife the town was during his own childhood, before the Havel River was

Rocco Buchta led the restoration of the Lower Havel River in Germany, working through a large civic sector organization. Photo: NABU

channelized to allow for more barge traffic. Buchta promised his grandfather that he would someday restore local wetlands along the Lower Havel to their former natural glory.

Following German reunification in 1989, Buchta began to make good on his promise to his grandfather. By that time he had earned an advanced degree in engineering and was working for NABU (Naturschutzbund Deutschland, or the Nature and Biodiversity Conservation Union of Germany), one of the nation's largest civic sector conservation organizations. After nearly three decades of dedicated work, a 56-mile (90-kilometer) stretch of the Lower Havel River has largely been restored thanks to the leadership of NABU, where Buchta is now project manager of the Institute for River and Riparian Ecology (Weber 2019). The project restored thousands of hectares of wildlife habitat, increased capacity to manage stormwater, improved water quality, and restored alluvial forests that sequester carbon and offer tree cover—effectively reducing the heat island effect. In recent years, conservationists from Holland, England, Korea, Russia, and other countries have visited the site to consider how to replicate the Havel River restoration far and wide (Strodehne 2019).

This and other case studies highlighted in this report—from the restoration of highlands supplying fresh water from Bogotá and Quito, to the reforesta-

tion of Chinese deserts and the greening of urban Baltimore County, Maryland—show how civic sector land conservation initiatives are providing critical nature-based solutions to climate change.

As impressive as these examples may be, the reader should be aware of several important caveats:

- Initiatives such as NABU's Havel River work can take many years and require navigating a multitude of regulatory, financial, political, and organizational obstacles. Many such initiatives fail to reach their ultimate objective due to lack of money, political will, organizational endurance, leadership, and other factors. Some initiatives may ultimately succeed but require multiple reorganizations before they reach their goals, trying the patience of even the most passionate and dedicated project proponents.

- Many such civic sector initiatives are launched with the implicit or explicit support of local, state, or national governments and multilateral organizations. This support may include laws and policies that enable conservation easements and covenants, ecosystem service and carbon credit markets, and incentives for sustainable land stewardship. Land trust and conservancy leaders and members often must advocate for such government policies and programs. Lacking such engagement, government incentives for land conservation may languish or disappear.

- Some of the practices that currently support civic sector participation in land conservation are still evolving, and in some cases their use and regulation are being vigorously debated. One prominent case is the spectrum of carbon credit markets across many jurisdictions. Uncertainty remains over how these markets can appropriately deal with the challenges of permanence, leakage, and additionality. To preserve public trust, conservation groups will benefit by working with certified offset programs and by following, where applicable, national and regional standards and recommended practices.

Acknowledging these issues, well-organized and strategically motivated nonprofits and nongovernmental organizations remain capable of addressing the climate crisis in unique and effective ways. Accordingly, many organizations are greatly expanding the scale and scope of their climate-related ambitions. The community of land conservation organizations around the world is in the early stages of forming a global network. Members of the community are eager to learn from one another about potential solutions to the difficult and pervasive challenges associated with climate change.

Public officials, citizens, civic sector leaders and practitioners, educators, and advocates can take significant steps to substantially deepen the impact of this work. These steps include:

1. Empower civic sector initiatives that are creative and ambitious in scope and scale.
2. Invest in initiatives with clear strategies and measurable impacts.
3. Aim for broad collaborations.
4. Share advanced science, technologies, and financial engineering techniques.
5. Support initiatives that are built to last, able to adapt, and ready to replicate.

The recommendations in this report can help policy makers and practitioners better understand the potential for land trusts and conservancies to provide effective solutions and leverage their innovation as we mobilize globally to fight climate change.

Greening Australia

On the 10th anniversary of World Environment Day (June 5, 1982), then Prime Minister of Australia Malcolm Fraser announced a National Tree Program to reverse the decline of trees across his nation. Greening Australia, created as the nonprofit partner of the government program, took responsibility for organizing a program to replant trees.

The organization has evolved since that date nearly 40 years ago into one of Australia's largest and most ambitious land conservation groups. Greening Australia's first corporate partner, Alcoa, started working with the nonprofit in its first year. By the early 2000s, the Greening Australia–Alcoa partnership was well on its way to setting a string of important precedents, including:

- refining now-common direct seeding techniques;
- launching an accredited carbon offset program available for participation by the general public in the mid-2000s, when climate change science was still being widely debated;
- developing a large-scale native seed bank, enabling the "collection, storage and sowing of 25 tonnes (27.6 tons) of native seed" across Australia; and
- helping to create a leading pilot for native grassland restoration projects (Greening Australia).

During the first decade of the 21st century, a young manager in Alcoa's corporate affairs department in Australia took a particular interest in the Greening Australia–Alcoa relationship. Prior to joining Alcoa, Brendan Foran had served as a Green Corps supervisor in Conservation Volunteers Australia programs and understood the value of cross-sector collaboration. After nine years with Alcoa, during which he earned a master's degree in business administration from Federation University Australia, Foran joined Greening Australia and now serves as its chief executive officer.

Foran continues to appreciate the strategic significance of such nonprofit-corporate collaboration today. In an article that named him a "champion" of the Shared Value Initiative (a project conceived of by Harvard Business School Professor Michael Porter and his collaborator Mark Kramer), Foran offers his take on working across sectors.

> "The opportunity for us lies in better articulating and broadening the conversations we have with corporate partners and private landholders of the commercial return and environmental benefits of undertaking large and ambitious large-scale landscape restoration projects in Australia." (Shared Value Project 2018)

Greening Australia's interest in collaborating with the private sector can be seen in its current small-scale projects and in the organization's very ambitious plans for the next decade. For example, in the midlands of the island state of Tasmania, south of the Australian mainland, Greening Australia is working to restore about 6,000 hectares (almost 15,000 acres) of critical habitat for seven local species that have global significance, including the Tasmanian Devil. Nearly 1,000 hectares (2,500 acres) have been restored with native vegetation, with 5,000 more hectares (12,355 acres) to be restored in coming years as part of the "Tasmanian Island Ark" project. In addition to restoring habitat, the project also generates carbon credits for local customers such as Pennicott Wilderness Journeys, a company based in Tasmania. The company reports that "Pennicott has 100 percent carbon offset its operations through Greening Australia for the past nine years. To date, it has contributed over AUD $400,000 (USD $284,000), which is being spent on biodiversity restoration across Tasmania. These donations have helped Greening Australia to plant over 200,000 trees, offsetting our CO_2 emissions more than six times" (Pennicott Foundation 2021).

As a whole, Greening Australia in 2020 sequestered some 60,000 tonnes (66,000 tons) of carbon and protected about 6,000 hectares (almost 15,000 acres) of habitat. That level of activity is only a modest base compared to the organization's annual targets for 2030. Those targets indicate the organization's tremendous scope, scale, and level of ambition. Greening Australia aims to protect more than 60,000 hectares (almost 150,000 acres) in 2030, more than 10 times the level reached in 2020. In addition, it aims to sequester some 3,300,000 tonnes (3,630,000 tons) of carbon in 2030, a figure more than 50 times as large as its annual achievement in 2020. As Greening Australia's *2020 Year in Review* report details, such ambition is in line with the huge climate challenge the world faces.

> We are serious about maximizing our impact. To ensure that we are contributing to solutions at a global scale, Greening Australia's 2030 goals are aligned with worldwide targets for climate action, sustainable development, land restoration and biodiversity (Greening Australia 2020).

Greening Australia's intention to achieve its 2030 goals is clear in its recent agreement with the Australian real estate giant Coldwell Banker Richard Ellis (CBRE). Greening Australia's agreement with CBRE, which staffs more than 90,000 professionals in more than 100 countries, is described in a May 2021 press release:

> The appetite to invest in environmental offsets including carbon sequestered through large-scale tree plantings has increased substantially amid corporate demand to achieve zero net emissions targets.
>
> Greening Australia has consequently appointed CBRE's agribusiness team as its exclusive real estate services partner, with a target to source 330,000 hectares of land by 2030, via a combination of lease, license, or ownership.
>
> Greening Australia's Foran said, 'The scale of the challenge means we need to leverage the best capabilities. CBRE will assist us in meeting our ambitious targets but also reward landholders for their role in improving the environment.'
>
> CBRE Agribusiness Associate Director Phil Melville said, 'CBRE is committed to using its expertise, resources and market influence to help our clients reduce the emissions their properties generate and to applying best practices that improve the sustainability of our own operations' (Greening Australia 2021).

CBRE Australia is not the only large corporate entity to recognize the economic significance of climate change. For example, Andrew "Twiggy" Forrest, a multibillionaire industrialist, recently announced his plans to vastly expand his investments in Australia's renewable energy capacity. Forrest expects to invest in projects that will serve both domestic and export markets. Similarly, the head of the Australian Renewable Energy Authority foresees Australia as potentially becoming 1,000 percent energy self-sufficient with renewables. That is, he projects that the nation can produce with renewables some five to ten times the amount of energy consumed by Australians domestically by exporting both electricity and solar-derived green hydrogen to places such as Malaysia and Japan (Vorrath 2021).

Greening Australia's remarkably ambitious efforts over the coming decade will be closely watched—and carefully scrutinized—across Australia, especially given Foran's current position as board chair of the Australian Land Conservation Alliance (ALCA). The successes and shortcomings of Greening Australia's effort are now and will continue to be reflected in the scope, scale, and ambition of the collective ALCA community. In 2020, the Alliance worked across more than 3 million square kilometers (nearly 750 million acres, a land area about 91 percent the size of India), worked with nearly 3,000 Australian landowners, attracted

A Greening Australia tree planting project in Penlup, West Australia. Photo: Greening Australia

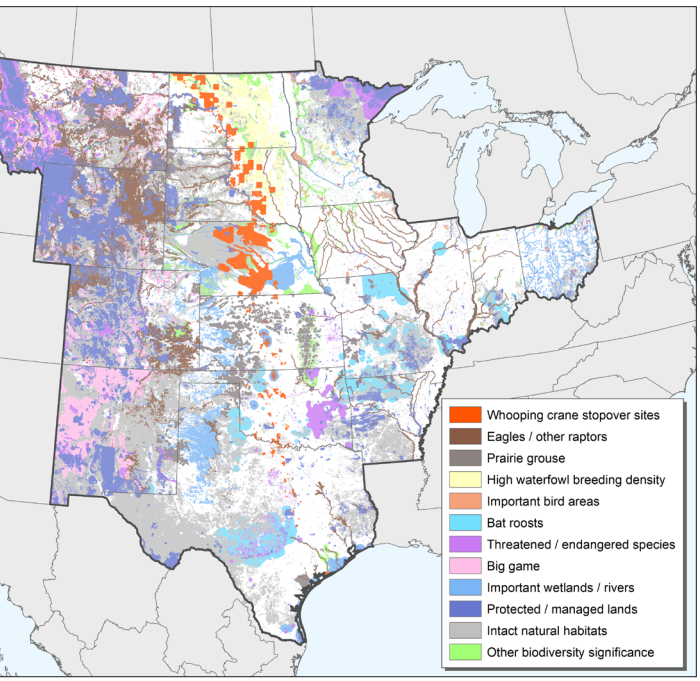
nearly 50,000 supporters per year, had a collective staff of some 650 individuals, and earned more than Australian $250 million (more than USD $190 million) in annual revenue (ALCA 2020).

The 2019 ALCA Congress in Adelaide asked: "How will we rise to the Challenge—smarter, faster, different, together?" Projects such as the Tasmanian Island Ark and Greening Australia's larger ambitions for the coming decade are answering that urgent question.

LEARN MORE

Additional resources are available from Greening Australia's website, www.greeningaustralia.org.au/, and the case profile of Greening Australia prepared by Cecilia Riebl for the Lincoln Institute of Land Policy, from which this example is excerpted: www.landconservationnetwork.org/resources-learning.

Sample Case Study: Energy Production and Distribution



Biodiversity layer of the Site Wind Right GIS map.
Image: The Nature Conservancy

Site Wind Right

In the popular imagination, the state of Kansas is flat as a pancake as far as the eye can see. In fact, eastern Kansas is home to the remarkably scenic, undulating Flint Hills, also known as the Osage Hills in Oklahoma. These hills host the last remaining landscape expression of tallgrass prairie left in North America (Ricketts 1999). Within the past several decades, the Flint Hills have become the focus of an innovative conservation effort that includes The Nature Conservancy, the U.S. National Park Service, the U.S. Fish and Wildlife Service, the Tallgrass Legacy Alliance, the Ranchland Trust of Kansas, the Kansas Land Trust, local ranchers, and other private landowners. Together, they are stewarding some five million acres of tallgrass prairie.

Brian Obermeyer, who today serves as the director of protection and stewardship for The Nature Conservancy in Kansas, was about one year into the job of leading a community-based conservation initiative in the Flint Hills in 2002 when he first encountered modern wind energy technology. While driving through Iowa to attend a conservation meeting in Minnesota, he noticed a new generation of windmills on the horizon. Obermeyer well understood the importance of renewable energy in helping to mitigate climate change. But it soon occurred to him that wind turbines in the wrong places could disturb wildlife habitats essential to the survival of plants and animals endemic to the Flint Hills and across the Great Plains of North America.

What Obermeyer and a few collaborators started has evolved over the subsequent two decades into a nearly continental-scale effort. The scientific research and wind-siting protocol project involves local and regional scientists across the center of the nation. Named Site Wind Right, the effort is helping to shape the geospatial configuration of a new generation of electric power facilities in the American wind belt, from Texas to North Dakota and from Ohio to Montana. It represents a way to proactively plan to site wind farms to protect biodiversity. The practice of systematically taking wildlife habitat into account when siting wind facilities is now gaining attention from policy analysts, engineers, and senior corporate executives from Argentina to Australia (Sheil 2020).

Conceptually, the Site Wind Right idea is fairly straightforward. An initial step is to make a comprehensive geographic information system (GIS) map of the places that have suitable wind resources for power generation in the geographic range of interest (in this case, a wind resources map layer of the American wind belt). The second step is to map out areas overlapping with the range or habitat of an endemic species (a biodiversity layer), such as the migration route for the whooping crane, along with areas of potential engineering and land-use restrictions (an infrastructure layer). The final step is to overlay the wind resource layer with the biodiversity and infrastructure layers, thereby showing the locations with suitable wind resources and few or no wildlife or infrastructure conflicts—yielding a map of suitable low-impact sites.

What sounds like a relatively straightforward task turns out to present multiple challenges. Gathering and mapping the knowledge of hundreds of biodiversity experts at a multitude of institutions is a huge task that can take many years to complete and then requires regular updating. The wind resource and land-use constraints map layers also require updating, but the underlying data is fairly well understood and readily available. Once the data is in hand, it has to be shared, understood, and used to locate and operate wind farms by potential developers and operators, utility and transmission companies, regulators, politicians at all levels of government, corporate buyers, families, and individuals.

In mid-America, the good news is that the challenges appear to be manageable. The range of suitable, low-impact sites for wind development within the 17-state area of interest is expansive. An in-depth study by TNC staff indicates that approximately 222 million acres (89.8 million hectares) of land in the study area has suitable wind resources. Of that land, about 90.4 million acres (36.6 million hectares) is considered suitable, and its development is unlikely to disturb wildlife habitats.

Ninety million acres equals the land area of about nine percent of the 17-state region. Based on the nameplate capacity of wind turbines at three megawatts per square kilometer (Gaughan 2018), those acres could accommodate 1,099 gigawatts of wind power capacity on low-impact, suitable land—an amount of power 10 times as great as all U.S. wind-generating capacity in 2019, and "equivalent to the total generating capacity from all sources" in the United States in 2018 (The Nature Conservancy 2019).

The creators of the Site Wind Right map don't view it as the definitive authority on wind turbine siting in the central United States. They suggest that more finely grained analysis and regulatory guidelines such as those issued by the U.S. Fish and Wildlife Service, the Federal Aviation Authority, and local authorities should also be taken into account.

Nevertheless, the big picture presented by the Site Wind Right methodology remains highly useful. Myriad sites in the U.S. wind belt could host large numbers of wind turbines while conservationists continue to protect wildlife and habitat. Furthermore, continued research and scientific advances will enable greater precision regarding where to best build renewable energy facilities while also stewarding our natural heritage.

The Site Wind Right methodology has reached beyond the United States. In locations such China and India, wind facility siting programs are emerging. Crafted to suit local conditions and legal frameworks, they are encouraging wind energy developers to locate their projects at low-risk sites in those nations. A recent report released by the International Union for the Conservation of Nature on mitigating the impact of wind and solar energy developments cites both Site Wind Right and "Power of Place," a complementary TNC study focused on planning renewables projects, as relevant examples.

Kansas wind farm as seen along Interstate 70. Photo: Getty Images

As wind and solar technologies in the U.S. and worldwide are deployed at unprecedented rates over the next several decades, a more holistic approach to renewable energy siting and planning will continue to emerge. If the international community is to reach ambitious biodiversity conservation goals, such as protecting 30 percent of the Earth's land area by 2030, mitigating "energy sprawl" will be imperative. That includes locating renewable energy facilities in low-risk areas. The methodology for doing so, already 20 years in development, must continue to evolve if land and water resources are to remain largely intact for future generations.

LEARN MORE

Extensive additional resources are available from The Nature Conservancy's Site Wind Right website, www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/site-wind-right/, as well as the case profile of Site Wind Right prepared by James Levitt at the Lincoln Institute of Land Policy: www.landconservationnetwork.org/resources-learning.

Lessons Learned

Fire management staff conduct a controlled burn in eastern Washington State to improve and restore the health of the ecosystem and reduce the risk of catastrophic wildfires.
Photo: Ken Meinhart/USFWS

The emerging impacts of climate change are felt deeply and widely all over the world. Land trusts and conservancies large and small are providing nature-based solutions that incorporate the best available science and offer multiple benefits for communities of all sizes. These organizations are highly experienced in working directly with communities and landowners. They understand their priorities and connections to land. Often they have forged local and regional partnerships and developed and executed long-term legal agreements, technical protocols, and management plans.

As natural partners in the global effort to fight climate change, more land trusts and conservancies are taking steps to create tools, build partnerships, and engage stakeholders across sectors to manage and steward lands for climate mitigation and adaptation. Their experience can inform future initiatives to catalyze and spread innovative solutions, inform policy, and move at greater scale and speed to meet the 21st century's most urgent conservation imperative.

Work Across Diverse Scales, from Local to Global

Land trusts, conservancies, and other civic organizations are protecting land and addressing climate-related challenges with measurably effective impact at many scales, from the creation of pocket parks in urban neighborhoods to the expansive network of water funds that now circles the globe.

The case examples examined in this Policy Focus Report range in geographic scale. Local initiatives include NeighborSpace in Baltimore and Cold Hollow Carbon in Vermont. State and regional efforts such as the Cutting Green Tape policy initiative in California, the River Havel restoration in central Germany, and the Partnership for Gulf Coast Land Conservation in the southern United States cross multiple jurisdictional boundaries to address complex problems. China's Ant Forest program, Greening Australia, and Site Wind Right—which spans the American wind belt from Mexico to Canada—operate or aspire to operate at a national scale. And BirdLife International's Migratory Soaring Birds program spans multiple nations and continents from North Africa to the Middle East.

The initiatives profiled here also involve a wide-ranging number of active participants. Cold Hollow Carbon engaged 10 landowners managing 12 parcels of land. In contrast, Ant Forest has engaged some 550 million consumers across China—about one-third of the people living in the world's most populated nation.

What should we make of this wide diversity in project scales? The basic concept is that nimble civic organizations working with private interests, academics, other NGOs, and the public sector can devise effective solutions from the very small to the exceptionally large. They can implement these solutions in a relatively direct and adaptive way. They make excellent partners for public sector institutions, which are often more constrained by shifting public opinions and policy priorities.

Address a Broad Scope of Challenges and Provide Multiple Benefits

As indicated by the chapter titles of this Policy Focus Report, civic sector land conservation organizations have launched initiatives aimed at addressing a broad diversity of purposes. Such purposes include coordinating stewardship and management practices across a mosaic of land ownerships (Cutting Green Tape); reforesting to restore ecosystem function and enhance carbon sequestration (Ant Forest); managing stormwater and preventing pollution (NeighborSpace); providing recreational resources (NeighborSpace, River Havel, Gulf Coast Partnership); protecting communities from changing riverside conditions and sea-level rise (Scenic Hudson); providing fresh water to water-stressed metropolitan areas (Water Fund network); providing essential land, inland, and marine wildlife habitats (Open Space Institute, Greening Australia); bringing forest carbon credits to market (Cold Hollow Carbon, Scenic Hudson, Greening Australia); siting renewable energy facilities appropriately (Site Wind Right); and preserving key migratory corridors for a multitude of birdlife (BirdLife Flyways Conservation).

Many of these initiatives provide multiple public benefits. The River Havel project in Germany simultaneously provides wildlife habitat, flood protection, economic development opportunities in the tourism sector, and recreational opportunities for local residents. Like-

wise, the Scenic Hudson programs in New York state are intentionally designed to provide holistic benefits including protection from rising water levels, pathways to carbon credit markets, improved agricultural practices, and enhanced local recreational resources.

The case studies illustrate the importance of communicating such multiple benefits so as to build enduring community support for these initiatives. By communicating research results, for example, conservation NGOs can remain in close touch with their public, private, nongovernmental, and academic partners, thus enabling further progress. At Scenic Hudson, for example, by recognizing residents' concerns about clean water, healthy food, and flood safety, the organization was able to develop language that connected land conservation to those priorities. When speaking with farmers, the organization framed land management solutions to focus on benefits to the farmers' bottom line instead of talking abstractly about carbon.

Focus on Long-Term Strategic Intent and Measurable Outcomes

Climate change is a complex phenomenon, and its potential consequences differ widely in time and space, requiring long-term strategic thinking and a focus on measurable outcomes. Each of the initiatives profiled in this report followed a discernable strategic intent, and each has identified tangible outcomes that have marked their success to date and will guide their future endeavors.

Ant Financial, working with NGOs including the See Foundation and the Paradise Foundation, set an early example among Chinese financial services firms by encouraging sustainable lifestyle choices among its clients. Deploying a strategy based on "gamifying" sustainable behavior, it has achieved remarkable, measurable growth. The Ant Forest initiative has brought more than a half-billion individuals into the program since 2016, planted some 220 million trees, and protected more than 100,000 acres (420 square kilometers) of land including sensitive habitat for endangered species. Its strategic challenge going forward will be to sustain customer growth and continue to substantially grow its conservation footprint.

Brendan Foran, chief executive officer of Greening Australia, has similarly ambitious strategic goals. As explained in Chapter 5, Greening Australia aims to protect more than 60,000 hectares (150,000 acres) in 2030, more than 10 times the level reached in 2020. In addition, it aims to sequester some 3,300,000 tonnes (3,630,000 tons) of carbon in 2030, a figure more than 50 times as large as its annual achievement in 2020. Foran has explained that such ambition is in line with the scale of the climate challenge worldwide.

While Ant Financial and Greening Australia have targeted very rapid growth, other initiatives such as Site Wind Right and the Open Space Institute have pursued more patient strategy development over the course of decades. Site Wind Right has taken 20 years to become a nearly national program. OSI's land protection strategies have evolved over the past 50 years from a focus on New York suburbs in the 1960s to a focus on the entire Appalachian corridor, from Georgia to Maine and beyond in the 2020s. Whether such strategies take a few years or many decades to mature, they all aim to meet quantitative targets and set a strategic example for peer organizations in their home countries and around the globe.

Sustain Collaboration

While the scale and scope of the initiatives profiled in this report vary from case to case, not one has reached strategic targets without collaboration. Collaborations may occur across land parcel boundaries, sectors, and areas of expertise from finance to remote sensing. Col-

Collecting green energy and planting trees on the Ant Group mobile app.
Photo: Shenmin Liu

laborating effectively is a key success factor for land trusts and conservancies aiming to achieve ambitious goals at the scale necessary to make headway in addressing climate change. By accessing cross-cutting knowledge and resources, developing trust and relationships with key partners generates greater efficiencies and impact than one organization could achieve alone.

The land trusts that joined the Partnership for Gulf Coast Land Conservation shared knowledge and access to resources, which reduced costs and leveraged funding from multiple federal agencies and other sources. The consortium in Vermont includes nonprofit, academic, and private sector members—Vermont Land Trust, University of Vermont, Cold Hollow Carbon, Spatial Informatics Group, and The Nature Conservancy—with a deliberately horizontal structure that harvests deep expertise about forests, carbon, rural economic development, and landowner values.

In Baltimore, the diverse regional partnerships that NeighborSpace forged with Morgan State University, local landscaping businesses, and local nonprofits through the Baltimore County Green Alliance served to mobilize volunteers, generate funding through open space fees, and build community support for park sites. As the Golden Gate Parks Conservancy and its Cutting Green Tape initiative demonstrates, establishing landscape-scale networks and partnerships allows organizations to make impact at scale on climate-related challenges such as wildfires that are not bound by jurisdictions or boundaries. And through its support of a dynamic group of land managers, scientists, and public policy advocates, Scenic Hudson is accelerating the implementation of natural climate solutions on working and managed farms, forests, and wetlands throughout the northeastern United States. Importantly, leaders in each of these examples intentionally reached out to community members of diverse cultures and ethnicities to participate in and help shape strategy and target outcomes.

As several cases highlight, strong partnerships and leadership by the private sector can make rapid growth possible. In China, Paradise Foundation International

is working closely with Ant Financial to support the rapid growth of the Ant Forest initiative. Greening Australia has signed an agreement to engage CBRE Australia, a global real estate services provider, to help source 330,000 hectares (815,100 acres) of land by 2030 via a combination of lease, license, or ownership to meet Greening Australia's tree planting targets.

The collaboration strategies profiled in this report are often characterized by strong management and well-articulated organizational structures and accountability. In the Site Wind Right initiative, for example, multiple state chapters of The Nature Conservancy coordinated with scientists from dozens of universities and research institutes to build a biodiversity risk layer for a mapping tool, and a core project team working out of TNC's Midwestern offices in Minneapolis coordinated compilation of the layer. Similarly, the Open Space Institute's Resilient Landscapes initiative involved training and engaging some 120 conservation organizations that were asked to work on "climatized" conservation plans. In addition, the Resilient Landscapes initiative coordinated and contributed to protecting land across several Appalachian subregions stretching from Georgia and South Carolina to Maine.

An active, centralized hub managed by ambitious, articulate leaders was key to the growth and effectiveness of the California Landscape Stewardship Network (CLSN). In helping to invent and advance CLSN's Cutting Green Tape initiative, Sharon Farrell and her team at the Golden Gate National Parks Conservancy have patiently, persistently catalyzed an effort that is now transforming landscape stewardship practices across California and beyond. They have positioned the Conservancy as a linchpin in the design, implementation, and proliferation of partnership models and impact.

Share Advances in Science, Technology, and Financial Engineering

Land trusts and conservancies can grow engagement, build support, shape strategies, and measure and illustrate outcomes by leveraging increasingly sophisticated and customizable tools and technologies, scientific insights, and financing platforms.

Technologies such as geospatial information systems (GIS) and remote sensing are often the backbone of efforts to prioritize and plan for nature-based solutions. The Nature Conservancy's intensive analysis and data collection for the U.S. wind belt exemplify how layering data on wind resources, biodiversity, and infrastructure allowed project partners to identify areas of potential biodiversity conflicts with renewable energy development across 17 states.

On a smaller scale, a cornerstone of NeighborSpace's work is a project called Portals for Our Partners, which creates websites for all park sites in Baltimore County, no matter their size. The websites enable community associations to share information about their parks, volunteer opportunities, community needs, and meeting times, and to generally build broader engagement and awareness among park users and the parks' neighbors.

Increasingly, technology adds muscle strength for civic organizations striving to address climate-related challenges. Through sophisticated algorithms and a mobile payment application, Ant Forest is engaging hundreds of millions of people through a game-like platform to protect carbon-rich forests. This tech-enabled, bottom-up approach is building support, changing behavior, and financing conservation at a huge scale. Similarly, Cold Hollow Carbon has bundled smaller land parcels into a single, marketable source of carbon credits, an initiative that points the way for carbon market aggregations emerging around the globe, from Australia and Africa to northern Europe and China.

Pioneering advances in conservation science are also helping to drive innovative civic sector initiatives related to climate change. Mark Anderson's work on resilient landscapes helps the Open Space Institute to focus increasing investment in climate corridors that will offer key refuges for biodiversity across continental-scale landscapes as air and water temperatures continue to rise. Similarly, BirdLife International's use of precision observation techniques—including radar, sonar, and remote sensing technologies—informs measurably effective policies on when wind turbines should pause to avoid disturbing major bird migrations.

Advances in remote sensing, artificial intelligence, mapping, genetic analysis of wildlife migrations, and financial platforms will certainly continue, leading to more effective ways to protect land and life on Earth in the coming decades. Encouraging international exchanges of these initiatives motivates others who are working on entrenched challenges, leading to still more invention.

Create Initiatives That Are Durable, Adaptable, and Replicable

DURABILITY

The climate crisis will inevitably persist for decades or even centuries. Civic sector initiatives must be durable in order to address the long-term nature of the challenge. Interpersonal and interorganizational trust are essential to any initiative that's built to last, given the amount of cross-sector collaboration required. Without a strong foundation of trust, One Tam in California, for example, would have never drawn in tens of thousands of volunteers or the wide variety of funders that keeps the coalition vibrant. The same is true for Baltimore's NeighborSpace, the many partners that restored the River Havel, and even the consumers who entrust Ant Financial to redeem their points to plant and nurture forests and habitats across China.

Durability also depends on the continuity of funding and leadership over time. Not explored in this report are the many well-meaning initiatives that have disappeared because of insufficient capital or lack of strong leadership over time. Suffice it to say that there is an abundance of such narratives.

ADAPTABILITY

It can take many years, and sometimes several decades, to propose, develop, test, refine, build support for, and take stock of land-based solutions to climate change. Spending the necessary time to build out local or regional tools or innovations can be painstaking work, but that groundwork is crucial for proving concepts that may then be implemented at greater scale and speed. This was the case for The Nature Conservancy's Site Wind Right effort, which began in the Flint Hills in Kansas and western Oklahoma. Over years of consultation and information gathering, a small group of TNC staff and partners developed the idea of mapping where to locate wind power across the Great Plains.

Scenic Hudson offers another example of how an organization can center its climate-related efforts around developing a model that may then be scaled up and adopted more broadly. Its work developing a sea-level rise mapping tool is now embedded in state-level policy in New York, which previously could not evaluate the impacts of sea-level rise during environmental review. Across the world, Greening Australia also illustrates how dedicating time to a solution can help an organization think bigger and seek to rapidly maximize its impact. In 2020, Greening Australia's land protection and management activities sequestered about 60,000 tonnes (66,000 tons) of carbon, but its annual targets for 2030 seek to sequester 50 times that amount.

A Water Fund supplies the sprawling city of Bogotá, Colombia, with fresh water. Photo: Starcevic/Getty Images

REPLICABILITY

Water funds exemplify how an organization can disseminate innovative natural climate solutions. The seed of the water fund concept grew within The Nature Conservancy, where key staff worked with local partners in Quito, Ecuador, to set up the world's first water fund in 2000. The organization is now widely recognized as the go-to source of information and expertise on this innovation. Through a dedicated Water Funds Toolbox and the support of networks such as the Latin American Water Funds Partnership, TNC has built on the early success of the model and adapted the formula to bring it to more than 30 cities around the world (24 in Latin America alone) by 2021.

The Site Wind Right example drew the interest of conservation peers across the globe. Markets such as China, India, and Argentina may adapt and develop the effort in an expanded form that could include siting tools for solar energy facilities.

Similarly, the restoration of the Lower Havel River is spawning potential emulation and replication within the European Union and beyond. Lessons learned from the experience are being considered for adaptation and replication by hydrologic engineering firms with global practices. The dissemination and implementation of best practices across nations and continents can take considerable time and patience. The payoff, however, is making progress toward mitigating and adapting to climate change on our home planet.

Recommendations

Sunrise over New England mountain ranges. Photo: Ken Canning/Getty Images

Land trusts and conservancies of all sizes and capacities are clarifying how to fight climate change through land conservation and stewardship. Policy makers and decision makers are considering how to address climate-related impacts in communities, states, and regions. Funders and donors are seeking to invest in projects and initiatives that offer effective, lasting solutions for reducing carbon emissions and improving climate resilience.

The case studies in this report demonstrate that many civic sector organizations—collaborating with partners in the public, private, and academic sectors along with Indigenous and tribal peoples—are developing powerful and pervasive climate-related solutions. Collectively, they are protecting vast expanses of land and engaging hundreds of millions of individuals.

The following recommendations provide general guidance for stakeholders in the private and public sectors seeking to help civic organizations implement natural climate solutions.

EMPOWER CIVIC SECTOR INITIATIVES THAT ARE CREATIVE AND AMBITIOUS IN SCOPE AND SCALE

As a young adult around the time when the Berlin Wall fell, Rocco Buchta imagined that the Lower Havel River could be restored to provide biodiversity habitat, flood control, and recreational and economic value to the region surrounding Berlin. His vision was tremendously ambitious, creating a plausible future for the Lower Havel watershed that had been virtually impossible to achieve over many prior decades. Buchta, working as an employee of NABU (Naturschutzbund Deutschland, the Nature and Biodiversity Conservation Union of Germany), worked diligently, creatively, and adaptively over the next three decades to realize his vision (Krüger 2006).

Many more young women and men like Buchta are affiliated with land trusts and conservancies in more than 100 nations on six continents, harboring similarly ambitious and ultimately feasible ideas. Supporting these visionary individuals is one key to success. Funders and decision makers from the public, private, philanthropic, and academic sectors should encourage boldly creative and ambitious initiatives with the human and financial capital to meet the challenge of climate change.

Ambition and creativity can help address local challenges as well as large regional problems. Just as Buchta's regional project found funding and political support from the German government, Barbara Hopkins of the Baltimore County land trust NeighborSpace catalyzed a campaign that convinced Baltimore County officials to dedicate "loss of open space" fees to create parks, which also help to manage stormwater and provide other benefits. Ambitious land trusts and conservancies can increase their success with climate change initiatives by collaborating with public officials, colleges and universities, and the private sector.

INVEST IN INITIATIVES WITH CLEAR STRATEGIES AND MEASURABLE IMPACT

The strategy and culture of successful civic sector initiatives and organizations can often be characterized as works in progress. Each of the organizations showcased in this report can clearly and concisely articulate its mission and strategy. Most of the initiatives include measurable objectives that have been met over time. Amid changing conditions, however, these strategies and measurable objectives also change. Such evolution is necessary.

To cite two examples, both the Open Space Institute (OSI) and Greening Australia have substantially adjusted their strategies and objectives over time. They have complemented existing initiatives within their organizations' strategic portfolio that have been focused primarily on landscape and biodiversity conservation. OSI's Appalachian Landscapes Protection Fund, for example, places a newly heightened focus on carbon

sequestration derived from protecting a parcel of land, complementing more well-established strategies that emphasize biodiversity conservation. Similarly, Greening Australia has expanded its sequestration efforts in recent years, primarily focusing on climate change. Both of these strategic shifts align with the recommendations of experts from the Intergovernmental Panel on Climate Change and the International Panel on Biodiversity and Ecosystem Services: "The mutual reinforcing of climate change and biodiversity loss means that satisfactorily resolving either issue requires consideration of the other."

As these examples illustrate, undertaking and communicating about initiatives that serve more than one purpose—with multiple benefits for communities, biodiversity, and climate—is necessary to build support and durability for natural climate solutions. Practitioners, funders, and decision makers should prioritize investments with multiple objectives including biodiversity protection, climate change mitigation, adaptation-related outcomes, and other economic, environmental, and social cobenefits.

AIM FOR BROAD COLLABORATIONS

Each of the case studies cited in this report achieved target objectives, at least in part, by collaborating across sectors, jurisdictional boundaries, professional disciplines, and diverse cultures, ethnicities, race, and gender. The "all hands on deck" strategy depends deeply on such collaboration.

To promote robust collaboration within a project, organizations can solicit diverse partners during the project's inception; work to reduce systemic barriers to collaboration such as archaic laws and regulations that keep national, provincial, and local governments, private sector actors, universities, and civic sector organizations from working smoothly together; and proactively build trust and knowledge among potential partners through joint planning exercises and cross-presentations of works in progress. In light of many national "30 by 30" mandates to protect 30 percent of the Earth's waters and lands by the year 2030, proponents of civic sector projects should enhance collaboration and reduce regulatory inertia, which prevents complementary individuals and organizations from working together to address interconnected regional problems.

To ensure their efforts are inclusive, organizations should work closely with local and Indigenous communities to find common ground. Good-faith collaborations offer an opportunity to set new precedents and chip away at long-held distrust and inequities and ultimately to protect vast—and sometimes sacred—landscapes.

SHARE ADVANCED SCIENCE, TECHNOLOGIES, AND FINANCIAL ENGINEERING TECHNIQUES

Case examples in this Policy Focus Report repeatedly underscore the advantages of leveraging emergent science, advanced technologies, and novel financial engineering techniques in the service of civic sector projects that provide climate change solutions. The Open Space Institute's Resilient Landscapes initiative leveraged science developed by Mark Anderson to set precedents in land conservation strategy. The Nature Conservancy's Site Wind Right project harnessed the fast-growing sophistication of GIS technologies to develop unprecedented maps of biodiversity risk spanning the entire midsection of the United States. And the Cold Hollow Carbon project spearheaded by the Vermont Land Trust pioneered carbon credit aggregation techniques that may be replicated by forest landowners across the Northern Forest of New York and New England.

Civic land conservation organizations around the world should continue to push the frontiers of precision conservation, advanced financial structuring, and innovative conservation science—and to share their advances with international colleagues. Both sides of technology transfer gain insights and motivation from such ongoing dialogues. Useful learning occurs when fresh minds adapt innovations in creative ways to fit their local, regional, and national circumstances.

EXERCISE STRATEGIC FLEXIBILITY, THINK LONG TERM

Good science, collaboration, and strategy can be for naught without sustainable financial resources and a dedicated, loyal, and deep staff that can withstand months or even years of setbacks. The ongoing COVID-19 crisis has made clear that extraneous forces may disrupt even the best-devised strategies. Stable financing and strong management appear to have allowed the Ant Forest project, for example, to continue gaining substantial consumer interest and momentum in planting forests and protecting land.

Similarly, even well-established organizations such as the Open Space Institute need to exercise strategic flexibility, adjusting their plans from time to time to adapt to changing conditions. OSI has evolved to increasingly emphasize climate change-related issues in the past decade. It has become a significant funder and conservation thought leader not only in New York, New Jersey, and New England but now across the entire Appalachian range.

Finally, civic sector organizations need to share their best ideas with colleagues if the land trust and conservancy communities are to gain prominence as global leaders in climate change solutions. The Latin American Water Funds Network has done an exemplary job helping to propagate its model across most of South America. Indeed, the Water Fund model is now being deployed in places as far apart as Portland, Maine, and Cape Town, South Africa.

Public, private, and civic sector decision makers and partners should continue overseeing and collaborating with large civic sector projects that protect land and provide climate change solutions. In doing so, these funders and decision makers can monitor and provide guidance to ensure that such projects maintain sustainable financial and human resources, strategic flexibility, and the willingness to help replicate successful operating models.

All these recommendations are feasible and beneficial. If well implemented, they offer powerful momentum for civic sector organizations that strive to provide climate change solutions. In the evolving struggle to rein in and cope with climate change globally, all sectors must work together to implement solutions that are sustainable, replicable, and reliable.

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