The Nature Conservancy

PLAYBOOK FOR CLIMATE ACTION

Pathways for Countries and Businesses to Help Address Climate Change Today

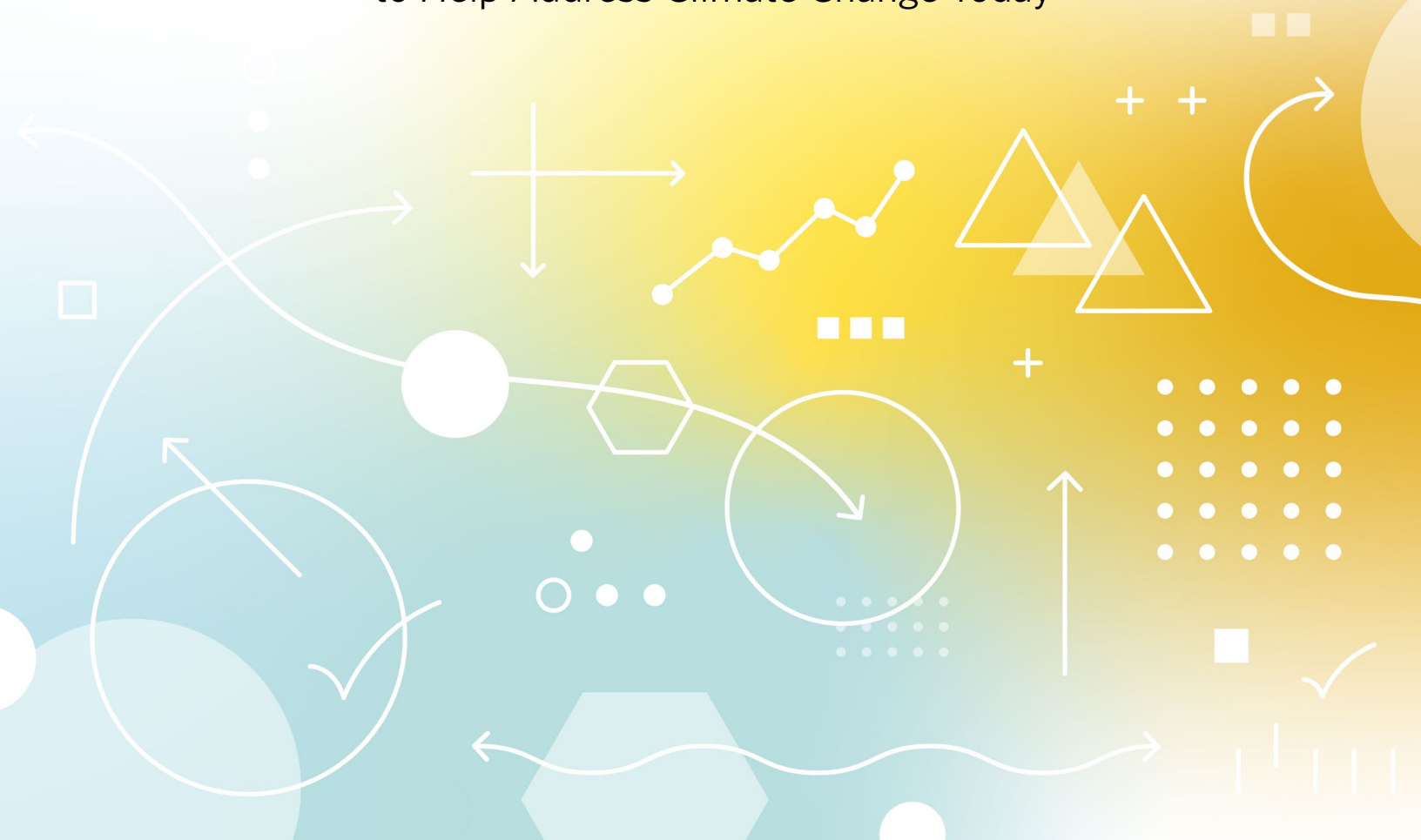
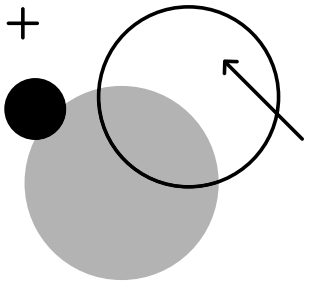


TABLE OF CONTENTS



3 INTRODUCTION

4 PULLING THE POLICY LEVER

- Carbon Pricing
- Clean Energy And Emissions Mandates
- Electrification And Grid Modernization
- Funding Innovation
- Investing in Nature-Based Solutions

9 LEVERAGING INNOVATIVE FINANCIAL SOLUTIONS

- Blue Bonds For Conservation
- Insuring Natural Infrastructure

13 NATURE AS A CLIMATE SOLUTION

- Reducing Deforestation
- Reforestation
- Managing Forests Responsibly
- Improving Soil Health

19 THE POWER OF BLUE: OCEANS, COASTS, AND FRESHWATER SYSTEMS

- Blue Carbon
- Nature's Role in Building Resilience

23 SMART DEVELOPMENT

- Siting on Degraded Lands
- Urban Planning for Climate Change

PLAYBOOK FOR CLIMATE ACTION

Climate action is imperative. Each successive month brings new reports of record heat, unprecedented glacial melting, extreme weather events, and countless other indicators that the climate is changing, with severe and increasing consequences for communities around the world.

Yet despite the overwhelming evidence, and the global consensus that led to the 2015 Paris Agreement, action from governments and corporations still lags far behind what's necessary to keep the planet below a 2°C threshold of warming, and nowhere near what's required to stay below the 1.5°C target that many developing nations believe is needed for their very survival.

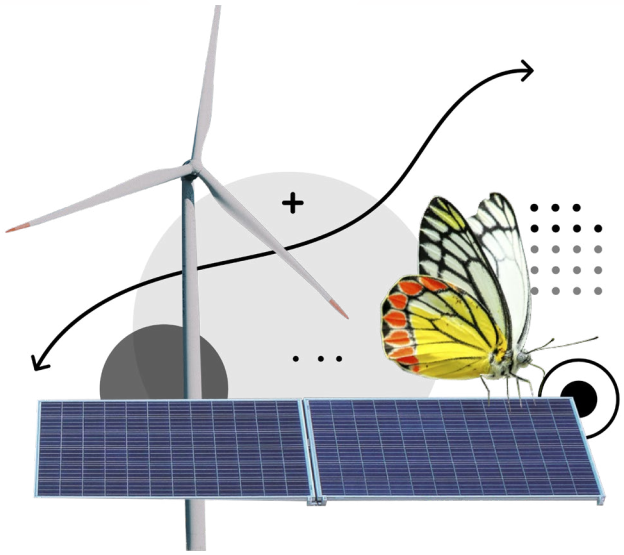
But we can still bridge the gap between what's been promised to date and what scientific consensus says is required. Many of the actions that can be taken by countries and corporations are not a mystery. Countries around the world are already enacting pathways towards a low-carbon future. Many of these pathways show tremendous promise, and if they were taken to greater scale and implemented in multiple geographies at once, we might see a real change in our emissions reduction trajectory and our long-term outlook regarding the warming trend.

Most efforts and funding to date have been focused on accelerating the transition to clean energy and improving energy efficiency. We can't tackle climate change without changing our energy systems—but we also can't get there without harnessing the power of natural landscapes, to reduce impacts we're experiencing and turning them from sources of carbon emissions to carbon sinks.

That's why The Nature Conservancy (TNC) is committed to helping advance a comprehensive suite of innovative, science-informed solutions that match the urgency of the climate crisis, from restoring forests from Brazil to Indonesia and ramping up progress on our clean energy future and investing in nature-based solutions to reduce the impacts. By escalating and expanding work like the solutions described below, our planet can reduce the catastrophic impacts of climate change.

Most important of all, these climate actions represent opportunities that are available RIGHT NOW, in both public and private sectors. These solutions provide real, tangible benefits for people, nature, and our planet today, and show the diversity of activities that can be undertaken depending on geography, capacity, or other factors.

PULLING THE POLICY LEVER



Carbon Pricing

Economists across the political spectrum generally agree on the easiest and cheapest way to reduce greenhouse gas emissions—putting a price on carbon. A well-designed carbon tax could be relatively straightforward to administer and would incentivize new technologies that accelerate the transition to cleaner energy. And if swapped for another tax—for example, a reduction in the corporate tax rate—it could even help grow national economies.

Earlier in 2019, Canada became the latest country to implement a national price on carbon, joining nearly 40 other countries that either have a carbon tax or a cap-and-trade model. Since Great Britain implemented a carbon tax in 2013, the country has moved away from coal power generation and seen a steep drop in energy emissions. Draft legislation for other major emitters is under discussion, including in the United States, and is supported by many of the world's leading companies. Already, the Regional Greenhouse Gas Initiative in the Northeast and Mid-Atlantic United States has successfully driven emissions from the power sector down 40 percent in the region, and those states are now hoping to implement a similar regional approach for transportation sector emissions, known as

the Transportation and Climate Initiative. State or regional efforts to price carbon across sectors can both drive down emissions in the short term and ease the transition toward a national carbon price in the longer term. There are many ways to frame smart carbon pricing policies, and TNC is committed to helping identify solutions that can garner support in countries and communities around the world.

Clean Energy and Emissions Mandates

The electric power industry is in a state of rapid transformation, and in the next decade, we will see a reinvention of how we generate, store, transmit and use electric power. New infrastructure, new business models and new energy services are needed so the global economy can reap the full benefit of these new opportunities. For years, renewable energy in the form of wind and solar energy was considered an interesting option for obtaining electric power, but somewhat infeasible because of cost and reliability. Because the sun didn't always shine, wind didn't always blow, and coal and natural gas were so much cheaper and produced reliable power, renewables had little market traction.

But the times have changed, the technology has advanced, and it's a new day. Solar panels now produce more energy more efficiently. Wind turbines have grown in size and produce more energy. Battery technology has advanced to the point where renewable installations that utilize solar-plus-storage or wind-plus-storage can bring electric power to the marketplace at costs that rival or even beat the cost of fossil fuels, including natural gas. New renewable energy sources, including geothermal, wave action, and other innovations are being explored.

"The times have changed, the technology has advanced, and it's a new day."

With the success of state-level renewable portfolio standards, U.S. states recently have ramped up to better achieve emissions reductions in line with climate goals. These have come in the form of either: 1) new mandates for emissions-free electricity, with a long-term goal of 100 percent; or 2) mandates for driving economy-wide emissions toward net-zero, which would allow for carbon capture and natural climate solutions to play a significant role. Colorado, Maryland, Nevada, New Mexico, New York, and Washington are just some of the states where TNC has been active in shaping those solutions.

Electrification and Grid Modernization

Clean energy resources lead to lower emissions, increase consumer choice, and create jobs. To most effectively deploy and optimize the use of these innovative resources, and to meet increasing demand for electricity without further harming public health or our environment, the electric grid must be modernized. Among many other benefits, grid modernization will create greater resiliency, improved reliability, enhanced security, economic benefit to individual consumers, and increased sustainability through the addition of cleaner and more energy-efficient resources. Comprehensive infrastructure legislation and the annual appropriations cycle present important opportunities for investing in updating the electric grid.

Modernizing the electric grid and transitioning toward electric vehicles will help facilitate the move toward renewable and other zero-carbon energy resources and leverage the progress already made in reducing emissions from the electric power sector. TNC has supported efforts at the state and federal level to provide greater incentives for electric vehicles, investments in charging infrastructure, tax incentives for energy storage, increases in energy efficiency and demand response, and research and development into technologies that will reduce emissions from the electricity, transportation, and industrial sectors.

Funding Innovation

Global leadership in energy innovation has advanced a number of clean energy priorities over the past several decades. In the United States., federal investments have helped spawn new and lucrative domestic industries, created millions of well-paying jobs, increased energy security, enhanced the nation's global influence, and reduced emissions. While these are impressive returns on investment, there is still enormous untapped potential in this sector.

Robust and well-directed federal funding is needed for vital research, development, and demonstration activities. Federally supported efforts continue to cut the costs of advanced wind, solar, storage, and other next generation renewable technologies; improve the efficiency of buildings, power plants, light- and heavy-duty vehicles, electric grids, and manufacturing processes and facilities; accelerate the development of low-carbon fuels and resilient, economical nuclear energy technologies; and unlock opportunities to capture carbon, store it, or use it to make valuable products.

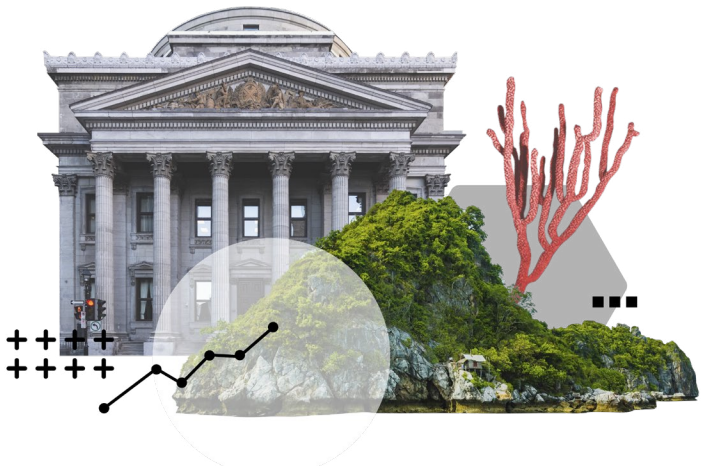
Investing in Nature-Based Solutions

According to a report by the World Meteorological Organization, 62 million people around the world were affected by extreme weather and climate events in 2018, including over 2 million people displaced from their homes and 37 million people affected by flooding. The trends are clear. Impacts from extreme weather exacerbated by climate change—such as flood, drought and wildfire—are on the rise and with it, are catastrophic impacts to people and property costing trillions of dollars.

Investing in federal programs to mitigate risk in advance of storms, especially by implementing natural infrastructure solutions, is a cost-effective approach that also meets growing infrastructure demands. Whether used alone or with gray infrastructure, nature-based solutions like wetlands, living shorelines and oyster reefs have been proven to generate significant economic and protection benefits, as well as avoid financial losses for coastal communities. There is opportunity to enable these investments through pre and post disaster investment as well as in programs such as the U.S. National Flood Insurance Program.

At the same time, there is tremendous need to invest in building, repairing and enhancing investments in all types of infrastructure. When making these investments, enabling investment in nature-based infrastructure should be considered as a means to enhance the resilience of infrastructure and deliver a host of benefits such as flood risk reduction, pollution abatement, recreational opportunities and breeding habitat for fish and animals that typical grey infrastructure alone does not deliver. Numerous studies and projects demonstrate that investing in nature-based infrastructure can save money and deliver a suite of benefits.

LEVERAGING INNOVATIVE FINANCIAL SOLUTIONS



Climate action is impossible without proper resourcing. TNC is pioneering several models that represent breakthrough innovations in finance for climate mitigation and adaptation efforts.

Blue Bonds for Conservation

Climate change, compounded with other threats like pollution and overfishing, has put the ocean in a dire state, and, in turn, endangered coastal communities. Increasingly severe storms and ocean acidity are pushing coral reefs to the brink of extinction, and the loss of those reefs and other coastal habitats such as wetlands, mangroves and shellfish reefs leaves coastal communities more vulnerable to the impacts of storms and rising sea levels. For many island and coastal nations, these are matters of life and death.

Leaders of these nations want to protect the ocean—but too often they are struggling to manage their countries' debt and unable to invest in the conservation efforts that would make their environments and economies more sustainable and resilient.

Blue Bonds for Conservation are an opportunity for island and coastal nations to reinvest in their natural resources by refinancing

their national debt in a way that secures funding for conservation work that also benefits their economies.

The countries' governments commit to protect at least 30 percent of their near-shore ocean areas, including coral reefs, mangroves and other important habitats for climate resilience, and engage in ongoing conservation work such as improving fisheries management and reducing pollution.

Next, organizations such as TNC leverage public grants and commercial capital to restructure the nations' sovereign debt, targeting lower interest rates and longer repayment periods. A portion of those savings fund the new marine protected areas and the conservation activities to which the country has committed.

We've already seen the debt conversion model that Blue Bonds are based on can produce conservation outcomes. In 2016, the Republic of Seychelles worked with TNC to restructure part of its national debt, freeing up $430,000 per year for marine conservation. As of 2019, the government has established marine protected areas (MPAs) covering 350,000 square kilometers of ocean areas, or 26% of its marine territory—taking the country over halfway to its goal of protecting 30 percent of its marine territory by 2020.

Now, TNC is working to take this model to at least 20 more countries in the next five years, creating MPAs and sustainability plans that would benefit more than 40 million people and conserve 15 percent more of the world's oceans than are currently protected.

Insuring Natural Infrastructure

Across the world, an estimated 840 million people live with the risk of coastal flooding, and the health of their economies is directly related to the health of their coastal ecosystems. Natural systems like coral reefs, beaches and wetlands are often the first line of defense against storms—a healthy coral reef can reduce up to 97 percent of

a wave's energy before it hits the shore—as well as providing a source of economic activity through fishing, tourism, and other industries.

But coral reefs can themselves be damaged by severe storms—especially those that have already been weakened by pollution, disease, overfishing and bleaching—which greatly reduces the protection they offer for coastal communities.

In 2005, Mexico's Caribbean coast was struck by two hurricanes, causing D$8 billion in damages and closing hotels and other businesses in Cancún long enough to cause further economic impact. But some hotels and beaches in Puerto Morelos suffered less damage than other areas in the state of Quintana Roo. Further analysis pointed to an important connection—Puerto Morelos was protected by an intact stretch of the Mesoamerican coral reef system.

This insight helped lead to the development of The Coastal Zone Management Trust, via collaboration between the State Government of Quintana Roo in Mexico, TNC and partners in the science community.

"This first-of-its-kind, innovative funding system will help protect a $10 billion tourism industry; improve climate resilience and bolster the region's economy; encourage conservation of a valuable natural asset; and create a scalable new market for the insurance industry."

The trust will receive taxes, collected by the tourism industry, that can be used to fund maintenance and restoration efforts for 60 kilometers of reef and beaches in the Cancun and Puerto Morelos areas. In addition to funding ongoing conservation work, the trust will also be used to purchase an insurance policy which will be triggered when severe weather hits the area of reef, as reefs can be damaged in when wind speeds exceed approximately 100 knots. The released funds can then be used for restoration activities to help the reef recover—and return to its full protective capacity—more quickly.

This first-of-its-kind, innovative funding system will help protect a $10 billion tourism industry; improve climate resilience and bolster the region's economy; encourage conservation of a valuable natural asset; and create a scalable new market for the insurance industry—a model which could be applied to other regions and ecosystems across the planet.

NATURE AS A CLIMATE SOLUTION

Climate change is a global challenge, requiring solutions on a global scale. And one of the most promising global solutions is already hiding in plain sight. Our lands provide an untapped opportunity – proven ways of both storing carbon and reducing carbon emissions in the world's forests, grasslands and wetlands: natural climate solutions.

Natural climate solutions can help address climate change in three ways:

1. Reducing greenhouse gas emissions, such as carbon dioxide, related to land use and changes in land use;
2. Capturing and storing additional carbon dioxide from the atmosphere;
3. Improving resilience of ecosystems, thereby helping communities adapt to the increases in flooding, dry spells, and other impacts of climate change.

Despite the tremendous potential of natural climate solutions, which could deliver more than a third of the emissions reductions needed by 2030, they currently receive less than 3 percent of climate finance. These solutions can help us change that.

Reducing Deforestation

A significant driver of climate change, deforestation continues to be a massive global problem—in 2016, the world lost over 29.7 million hectares (73.4 million acres) of tree cover, an area almost as large as Italy. Avoiding most of that deforestation would prevent the release many millions of tons of carbon dioxide equivalent per year.

Current challenges to preventing deforestation are both political and economic. Avoiding deforestation will require establishing large-scale incentives and regulatory mechanisms to address the major sources of deforestation, such as cattle ranching in the Amazon or palm oil production in Indonesia. Furthermore, rural communities that have depended on unsustainable forest clearing will need help in developing alternative livelihoods.

Avoiding forest conversion is a relatively low-cost pathway that's ready to be put into practice immediately. As measurement and monitoring techniques have improved, we have the tools needed to stop deforestation. Already, regional efforts to avoid deforestation are showing promise, if not nearly enough impact. In Indonesia, a 2016 moratorium on the drainage of peat forests led to a 60 percent drop in deforestation in the space of a year, which is an emissions

reduction of 200 million tons of carbon dioxide. In Brazil, better forest governance, satellite monitoring, and enforcement of soy and beef related deforestation helped reduce rates 70 percent between 2005 and 2013. Brazil's 'deforestation deceleration', alone, helped avoid the emissions of 3.2 billion tons of carbon dioxide into the atmosphere. And while recent political changes have slowed efforts to protect against deforestation in Brazil and other key geographies, the blueprint remains to provide real mitigation impact.

Focusing on single regions will not be enough, however. When forest loss is averted in one region, it is often "transplanted" to another part of the world. To prevent deforestation, we must take an integrated, global approach. But these regional examples demonstrate its efficacy as a solution and could pave the way for an international approach to avoided deforestation.

Reforestation

Huge swaths of temperate and tropical forests have been cleared for human activity. Many of those lands are being used productively to grow food—but many other deforested lands are degraded and are good candidates for cost-effective reforestation. Reforestation is the single largest nature-based climate mitigation opportunity—and provides cleaner water, cleaner air, flood control, and more fertile soils, not to mention wood products and tree crops through sustainable management practices.

Reforesting these degraded lands would sequester billions of tons of carbon dioxide without disrupting food production. In some cases, reforestation can be inexpensive and as simple as refraining from burning marginal grazing land, allowing forests to regenerate naturally. In other cases, reforestation can require active planting of trees and long-term care as they grow—a relatively expensive form of land-based sequestration. But we can leverage even this higher-cost opportunity by creating the financial incentives to plant trees – billions of them – and creating new markets for more sustainable timber and forest products.

> "Reforestation is the single largest nature-based climate mitigation opportunity—and provides cleaner water, cleaner air, flood control, and more fertile soils, not to mention wood products and tree crops through sustainable management practices."

Reforestation provides other benefits as well. Well-managed forests not only can cool the ambient temperature, but also provide a variety of other benefits to industry, such as:

- Helping water utilities and beverage companies by reducing sediment in water ways;
- Providing raw materials to food companies that rely on tree crops from agroforestry;
- Offering building companies sustainable timber for construction.

A wide variety of promising opportunities for forest restoration exist around the world, ranging from natural regeneration, to enrichment planting, to high-yield timber plantations. Opportunities occur in most countries, including both large countries like Brazil, India, and the United States, and many smaller countries like Panama, Ecuador, and Benin.

Managing Forests Responsibly

Many of the world's natural forests provide wood products critical to people's lives and livelihoods. Halting all logging in forests would achieve maximum carbon sequestration, but an end to logging is not realistic—and it may not be necessary.

Improving forest management practices allows natural forests to store more carbon while maintaining wood production for the long term. Logging should certainly be halted in some sensitive places, but the lost production can be made up by new wood production in reforested lands.

Extending harvest cycles, for example, allows trees to grow more before they're felled, increasing the average carbon stock across a working forest. Reduced-impact logging practices like cable winching can avoid damage to unharvested trees. And competing vegetation can be thinned to allow trees to grow faster and bigger. Implementing such techniques can allow working forests to sequester more carbon.

Improved natural forest management practices could be applied in some form to some 1.9 billion hectares of wood-production forest worldwide, an area twice the size of the United States.

A recently announced forest management project in the coal fields region of Kentucky, Tennessee and Virginia protects more than 100,000 hectares of local forests and will advance improvements in and maintenance of forest health, while generating revenues through the sale of Forest Stewardship Council-certified timber, carbon offsets and recreational leases. As markets for carbon, water quality, and biodiversity have matured, managing forests to maximize value beyond timber alone can be an attractive strategy and provide diversification – both ecological and financial. The project demonstrates how the private sector, governments and NGOs can collaborate to protect wildlife habitat, secure clean water for people and nature, and sequester atmospheric carbon to mitigate climate change, all while fostering important investments in local economies.

Improving Soil Health

Improving soil health on agricultural land can generate conservation and economic benefits, as well as mitigate the growing threat of climate change. Healthy soil is the cornerstone of life on earth,

facilitating ecosystem biodiversity, ample food production, effective water filtration and storage, and carbon sequestration.

Recent advancements in agricultural technology throughout the past century have allowed farmers to feed a population that has grown from less than 2 billion people to more than 7 billion today. Over the same time period, however, soil managed for agricultural purposes has degraded, losing as much as 60 percent of its original organic carbon content in the United States alone.

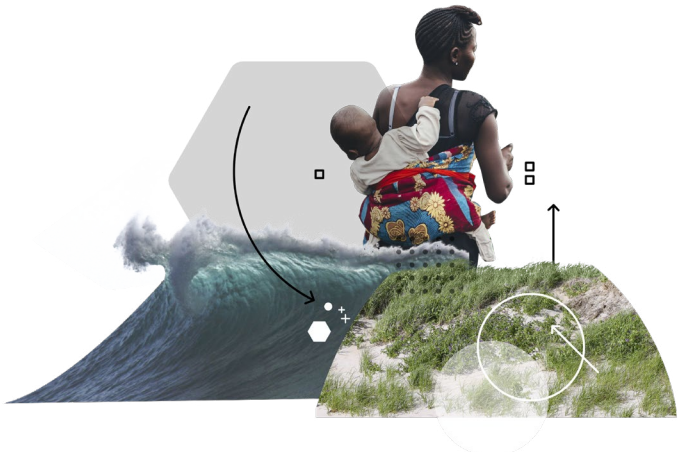
A 2015 TNC study on U.S. soil health suggests that adopting soil health practices on all U.S. corn, soy and wheat croplands could deliver nearly $50 billion in social and environmental impacts annually. Other takeaways from the TNC study include:

- Mitigating 25 million metric tons of greenhouse gas emissions—the equivalent to taking 5 million passenger cars off the road for one year.
- Reducing 344 million pounds of nutrient loss to the environment.
- Eliminating 116 million metric tons of soil erosion.
- Creating 3.6 million acre-feet of available water capacity in cropland soils.

Better soil management provides tangible environmental benefits and opportunities for farmers and agricultural producers, too, including substantial profit potential. Improving infiltration and water-holding capacity, for example, can significantly reduce irrigation water needs, lessen dust pollution, and improve nutrient uptake by plants, which can reduce input costs, and reduce plant stress, disease and pest pressure. Over time, these practices reduce the risk of yield loss due to these stressors and can bring about a material increase in crop yields and quality.

For too long we've ignored the crucial resource that lies beneath our feet. It's time to treat soil like what it is—the foundation of the world.

THE POWER OF BLUE:
OCEANS, COASTS, AND FRESHWATER SYSTEMS



There is no denying the importance of our oceans and water sources in dealing with climate change. Not only do oceans provide a tremendous carbon sink critical for a healthy functioning carbon cycle, but ocean currents have historically acted to serve as a cooler to slow the trend of global warming. The need for protection of a resource that makes up more than 70 percent of the Earth's surface is not a question, but an imperative.

Blue Carbon

The impacts of climate change are accelerating around the world, but perhaps especially fast for islands and coastal areas. In fact, recent studies suggest that more than a thousand low-lying tropical islands risk becoming "uninhabitable" by the middle of the century as rising seas bring battering waves, aquifers inundated with salt water and, eventually, full submergence.

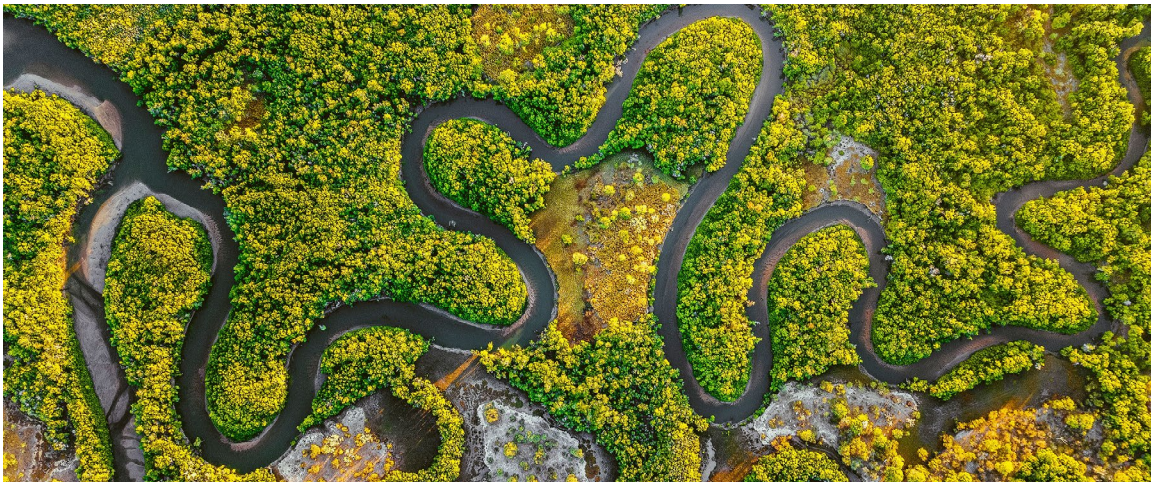
When looking at the role nature can play in climate action, forest carbon often attracts most of the limited attention. But coastal wetlands—tidal marshes, seagrass meadows and mangrove forests—sequester billions of tons of carbon from our atmosphere at

concentrations up to five times greater than terrestrial forests. The carbon sequestered and stored in these coastal wetlands is called "blue carbon," and it should also be a bigger part of this conversation.

Coastal wetlands also offer another benefit that sets them apart from other climate mitigation solutions—they protect coastlines by absorbing incoming wave energy and providing storm protection, often at lower costs than built or "grey" infrastructure such as seawalls and levees. TNC's own research illustrates how nature-based coastal resilience can save communities hundreds of millions of dollars when severe weather strikes, reducing flood damage by up to 29 percent.

Unfortunately, wetlands are being lost at an alarming rate —more than almost any other habitat—due to human activity. Experts estimate that the amount of carbon dioxide released annually from degraded wetlands is roughly 450 million tons, which is more than Australia's 2016 emissions. It is critical that we protect and restore the world's blue carbon systems. Not only will wetlands deliver ongoing carbon sequestration, they will also increase the resilience of coastal communities and economies.

If coastal wetlands were restored to their 1990 extent, they would have the potential to increase annual carbon sequestration 274 million tons per year, offsetting the burning of more than



2 billion barrels of oil. Add to this the tens of millions of tons of carbon emissions that could be averted by avoiding further wetlands loss and the global impact of coastal wetlands conservation and restoration is undeniable.

Nature's Role in Building Resilience

While most of the nature-based solutions discussed so far have primarily provided mitigation benefits, it would be shortsighted not to discuss the role nature can play in helping vulnerable communities reduce risks associated with impacts of climate change already underway. In the United States, from 2005 to 2015, just five major hurricanes caused more than 2,200 deaths and some $230 billion in damages. Average flood losses in this country have increased steadily to nearly $10 billion annually, driving the National Flood Insurance Program $24 billion into debt.

To counter these risks and rising costs, we need solutions that are better, cheaper and smarter—and some of our best solutions are also greener. Nations, communities and businesses are re-examining natural systems and their potential to meet economic, environmental and safety needs.

Living shorelines utilize a combination of structural and natural materials such as wetlands, marshes, sand dunes, mangroves or coral reefs combined with coir fiber logs, sand fill and stone. They can reduce wave intensity, prevent erosion and provide a host of other economic and environmental benefits. A healthy coral reef, for instance, can reduce 97 percent of a wave's energy before it hits the shore, protecting people and property.

Communities need access to natural infrastructure's efficient and cost-effective solutions such as natural infrastructure as the world's changing climate threatens to bring more frequent and more intense storms in the future. Nature-based solutions can help people, families and businesses defend themselves against these growing threats.

On top of that, they also provide communities with additional benefits such as enhanced recreational opportunities, increased tourism income, improved wildlife habitat and better water quality.

Specifically, by improving water quality, increasing the reliability of downstream water flows and contributing to food security, source water protection activities can move communities to a less vulnerable place. Furthermore, a science-based, adaptation focused source water protection plan can identify priorities for future protection, restoration and management based on climate models. These future implementation areas may be different from those on the ground today.

The need and opportunity for building resiliency through management of land and water is increasingly obvious to many governments. 115 countries that signed the Paris Agreement mention the water sector as a key concern to when it comes to their nations' capacity to adapt to climate change. Moreover, many countries, especially those from the Global South, link adaptation measures to the eradication of poverty and the movement of those countries toward middle-income levels of development.

In addition to building resilience for human communities, source water protection can build resilience within aquatic and terrestrial ecosystems, sometimes in indirect ways. For instance, protecting or restoring riparian zones with native vegetation helps provide linear habitat connectivity, links different ecosystems, moderates temperature through shade and creates microclimates for local wildlife. Meanwhile, adaptation benefits to biodiversity also benefit people. The United Nations Environmental Program reports evidence suggesting that adaptation strategies that benefit native species and habitat can simultaneously build the resiliency of poor communities that rely on linked ecosystem goods and services.

SMART DEVELOPMENT

The climate community agrees that we have to accelerate the transition to clean energy—but we also have to think about how we make that transition, and where we put that new infrastructure. We need policies, planning and incentives that drive developers and investors toward smart siting for energy and other infrastructure—that's how we attract institutional-level investment in clean energy, site it well and ensure that natural lands are protected, whether development is in rural or urban areas.

Siting on Degraded Lands

Land is a finite resource. Each year, new studies highlight just how challenging the prospect of using available land to provide food, energy and housing for a growing population across the world will be, and how larger and larger swaths of land are no longer suitable for agriculture or other use, following decades of development or mining. But new research led by TNC suggests that recycling former mine lands for reuse as solar-energy installations could provide clean power, jobs and revenue for communities that are struggling to recover following the abandonment of those mines. Early pilots in

the United States suggest that this responsible siting for clean energy could change the game for solar energy and economic development.

Mining for coal, gold, lead, copper and other minerals has left behind a lot of land that's not always easy to reuse, despite laws that may require the mining company to reclaim the land after the minerals have been carted away. When it comes to land that was mined for coal, for example, many sites predate reclamation laws, and even when regulations are in place, stony, heavily compacted soil makes it hard to plant trees or grow crops. In addition, these properties may have contaminated water and unstable soils.

There is a lot of this land around, and in two locations in the United States separated by more than 2,000 miles, uncommon partnerships are forming to find ways to use these lands to promote economic revival in mining communities and make the transition to a low carbon future.

In the East, around 1.5 million acres of former mine lands—an area larger than Delaware—stretch across the Central Appalachian region from Pennsylvania to Tennessee. TNC estimates that hundreds of thousands of acres could be suitable for solar energy, enough to install dozens of gigawatts that could provide enough power to millions of homes and businesses across the region.

In the state of West Virginia, where the local economy is struggling with the decline of the coal industry, TNC is working with the local

Coalfield Development Corporation to secure funding to develop a 20,000-acre site of former mine lands and surrounding forests on which we plan to build out large-scale solar energy, responsible forestry and associated workforce development, among other projects.

In the state of Nevada, mining companies, renewable-energy developers and conservationists have worked together to help push legislation with the state government that led to a change in regulations allowing formerly mined lands in the state to be developed for renewable-energy projects. As the state possesses the largest hard rock (non-coal) mining industry in the United States, the decision immediately makes available tens of thousands of acres for potential development, with more in the queue. Solar is likely to be the dominant energy source, but the proposal considers wind and other energy sources as well.

For conservationists, guiding the development of renewable energy toward formerly mined lands has a dual benefit of encouraging low-carbon energy while keeping large scale-renewable projects away from lands that can better serve as habitat for wildlife and natural environments. A 2016 study shows that over the next two decades, new energy construction in the United States could spread across an area the size of Nebraska. Better to locate this development on lands that already are disturbed than to convert natural lands. Furthermore, by providing clarity and guidance on optimal siting, policymakers can actually reduce the investment risk for new energy installations, helping to further accelerate the transition to renewables.

Urban Planning for Climate Change

We can't discuss the impacts of climate change on communities without discussing cities, especially those near vulnerable coastlines. Globally, estimates suggest that urban populations will expand by 2.4 billion people in the coming decades—a rate equivalent to building a new London every seven weeks.

This continued growth will have an unprecedented impact on nature. TNC research shows that urban growth, if not carefully planned, could destroy habitat that stores an estimated 4.35 billion metric tons of carbon dioxide, the equivalent of carbon dioxide emissions from more than 930 million cars for one year.

Incorporating space for nature into the urbanization of coastal areas can shelter communities from flooding and storm surge, while significantly supporting efforts to protect biodiversity. Planning for urban nature at scale has the potential to transform cities, making urban areas a part of the global solution. Incorporating natural areas in and near cities provides critical habitat for wildlife, helps reduce dangerous heat, and protects natural carbon storage that could help mitigate climate change, keeping the annual emissions from hundreds of millions of cars out of the atmosphere.

There's still time to protect critical habitat even as cities grow, but it will take concerted planning. For starters, local governments need to be brought into national planning for biodiversity goals. City leaders also need to look proactively at the full range of benefits generated by biodiversity and ecosystem services, and bring together disparate departments, including public health, in order to create effective "greenprints" for urban growth that integrate natural areas within urban areas.

International institutions also have a role to play. Major international funding sources, such as the Global Environmental Facility and the Green Climate Fund, should seek to directly appropriate funding to mitigate the impact of urban growth on biodiversity and ecosystem services. Finally, the Parties to the Convention on Biological Diversity must take the time between now and 2020 to plan for what urban conservation efforts are needed to meet the challenges ahead, including specific goals like urban growth targets or urban-based metrics that measure progress against the Aichi targets. Each of these dialogues understands the fundamental truth that climate change is driving pressures on all environmental assets and must be dealt with to address their objectives.

Questions? Collaboration? Get in touch with us at media@tnc.org or visit nature.org/climate

The Nature Conservancy is a global conservation organization dedicated to conserving the lands and waters on which all life depends. Guided by science, we create innovative, on-the-ground solutions to our world's toughest challenges so that nature and people can thrive together. We are tackling climate change, conserving lands, waters and oceans at an unprecedented scale, providing food and water sustainably and helping make cities more sustainable. Working in 72 countries, we use a collaborative approach that engages local communities, governments, the private sector, and other partners.