Tapping into U.S. Forests to Mitigate Climate Change

A POLICY SOLUTIONS TOOLKIT
BY THE FOREST-CLIMATE WORKING GROUP

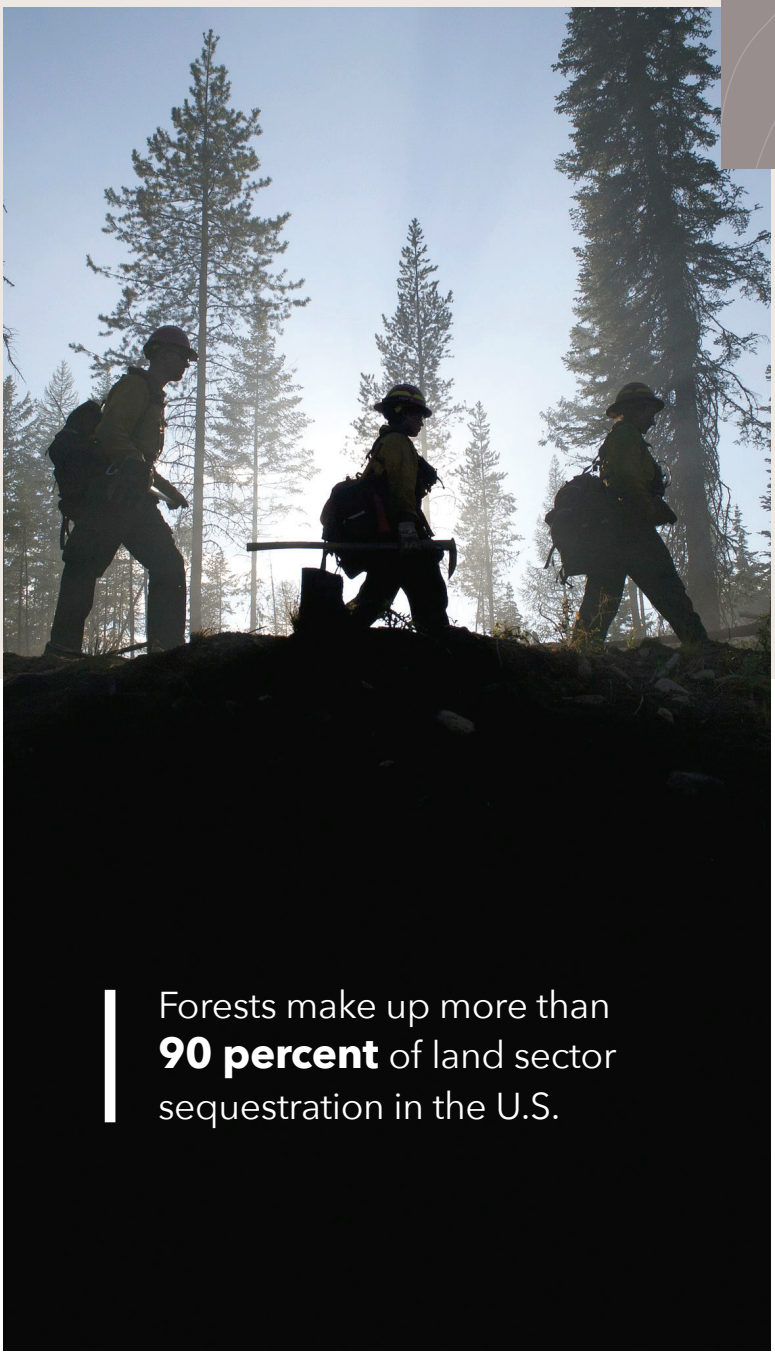
Forests play

a critical role

in absorbing

carbon emissions.

FOREST-CLIMATE
WORKING GROUP



Forests make up more than **90 percent** of land sector sequestration in the U.S.

Introduction

Forests play a critical role in absorbing carbon emissions. Over the last decade, forests in the United States have continued to sequester more carbon than they emit each year through removal and storage in forests and forest products. This powerful emissions sink offsets nearly 15 percent of total U.S. carbon emissions.[1] Forests make up more than 90 percent of land sector sequestration in the U.S.[2]

Various analyses, including the *United States Mid-Century Strategy for Deep Decarbonization* (2016) and *Natural Climate Solutions* (Griscom et al. 2017), suggest that the U.S. land sector can offset a growing percentage of U.S. carbon emissions. These projections rely on two factors working together: taking action in the land sector to assure a stable or slightly growing net sink combined with an anticipated decline for U.S. greenhouse gas emissions to offset other sectors like power generation.

Both the *Mid-Century Strategy* and *Natural Climate Solutions* emphasize that assuring a stable or growing forest sink in the U.S. will require a combination of practices to enhance future sequestration and reduce emissions. Increasing forest carbon sequestration can be accomplished by investing in reforestation to expand forest cover and helping landowners to deploy carbon-oriented forest management strategies. Reducing forest emissions and preventing loss of future sequestration power can be accomplished by investing in actions such as conservation easements to prevent forest conversion and forest restoration to reduce risk of catastrophic fire. These defensive actions are needed to address projections from the U.S. Department of Agriculture that anticipate increasing loss of forests to other land uses and increasing forest mortality from forest stresses that are magnified by climate change.[3]

1 https://www.fia.fs.fed.us/library/brochures/docs/2012/ForestFacts_1952-2012_English.pdf
2 United States Mid-Century Strategy for Deep Decarbonization (2016)
3 Wear and Coulston, From sink to source: Regional variation in U.S. forest carbon futures, Scientific Reports **volume** 5, Article number: 16518 (2015)

Various analyses suggest that the U.S. land sector can offset a growing percentage of U.S. carbon emissions.

State and local governments have a remarkable opportunity to catalyze the needed actions in the forest sector to stabilize and grow this important carbon sink. Capturing this opportunity will require identifying appropriate forest-climate practices and enacting policy solutions to encourage their adoption by thousands of forest landowners and managers on public and private lands alike.

State and local governments have a remarkable opportunity to catalyze the needed actions in the forest sector to stabilize and **grow this important carbon sink.**

The Forest-Climate Working Group (FCWG) is a diverse group of 40 organizations across the U.S. forest sector that includes landowners, industry, conservationists, academics, and carbon market interests. This Toolkit represents our collective insights from a decade of collaboration to identify the most effective ways for government and the private sector to collaborate on forest-sector carbon mitigation.

The Forest-Climate Working Group's approach to state and local policy solutions is designed to be flexible and tailored for each state's unique context. We encourage state and local governments to consider a wide range of tools to deliver financial incentives for forest sector carbon mitigation, including offsets, cost-share payments, grants, and tax incentives. We also encourage consideration of state actions that go beyond financial stimulus, such as adjusting public land management, land use regulations, promotion of harvested wood products, and educating landowners and land managers about climate change.

Our group stands ready to work with interested states and other units of government to help evaluate and potentially adopt the approaches described in this Toolkit.

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Background

Climate Change

After more than two centuries of industrialization, and the release of 375 billion tons of carbon dioxide into the atmosphere, the Earth's climate has changed dramatically.[4] The average global temperature has increased by more than 2°F over the past 140 years, and the consequences are grave. Rising sea levels threaten coastal communities, and drought, fire, floods and super storms are becoming more intense and frequent. The climate change threat to people and nature is no longer speculative.

To avoid the most catastrophic impacts of climate change, global temperature increases must be kept below 3.6°F from pre-industrial levels. For that to happen, the planet needs to reach net zero greenhouse gas emissions by 2050. [5] [6]

Forest Carbon Dynamics

THE FOREST CARBON SINK

Forests are highly effective in sequestering carbon dioxide pollution. More than 90 percent of land sector sequestration in the U.S. is attributed to forests.[7] Forests capture carbon rapidly, in great quantity and for long periods of time, storing it in tree trunks, leaves, branches, roots, and soil. This carbon capture and sequestration, a function known as providing a "carbon sink" or "negative emissions", plays a vital role in reducing greenhouse gas emissions with potential to do more. Over the last decade, U.S. forests and forest products have annually provided a net carbon sink equivalent to nearly 15 percent of emissions from combustion of fossil fuels. In some years this net sink has exceeded 850 million metric tonnes of carbon dioxide equivalent (abbreviated as "MMt/CO_2e").

[4] https://www.carbonbrief.org/doha-infographic-gets-the-numbers-wrong-underestimates-human-emissions, https://insideclimatenews.org/news/19052016/global-co2-emissions-still-accelerating-noaa-greenhouse-gas-index

[5] https://global.nature.org/initiatives/natural-climate-solutions

[6] http://www.wri.org/blog/2015/12/cop21-qa-what-ghg-emissions-neutrality-context-paris-agreement

[7] United States Mid-Century Strategy for Deep Decarbonization (2016)

URBAN FORESTS AND TREES

Urban forests and trees offer significant contribution to these carbon benefits, sequestering nearly 100 MMt/CO_2e annually, which is more than 10 percent of the total U.S. forest carbon sink.[8] Urban trees offer additional carbon mitigation benefit by moderating the environment around homes sufficient to lower national residential energy use by 7.2 percent through reduced need for cooling and heating.[9] This emissions reduction benefit is not reflected in U.S. Environmental Protection Agency's national greenhouse gas inventory for the land sector. Urban forests' other environmental co-benefits include stormwater management, improved air quality, matched by a host of social, community, wildlife and economic co-benefits.[10]

WOOD PRODUCTS

Wood is an extremely effective material for storing carbon. Long-lived wood products provide long-term carbon storage for nearly 100 MMt/CO_2e every year—more than 10 percent of the U.S. forest carbon sink—while the working forests from which they were derived continue the growth and sequestration process.[11] The increased use of wood in buildings has the potential to sequester and store over 32 million tons of carbon each year in the United States.[12] Harvested forest products offer an additional climate mitigation benefit in the form of avoided emissions that occur when wood products displace the use of fossil-fuel intensive building materials, like steel and concrete. This additional emissions reduction benefit from wood products is not reflected in U.S. EPA's national GHG inventory for the land sector.

FOREST MORTALITY AND CONVERSION

America's forests are under increasing pressures from disturbances such as fire, drought, invasive species, insects, pests and disease, and urban development. Climate change is playing a significant role in many of these disturbances. Of particular concern are widespread forest fires, with 250 MMt/CO_2e or more of additional emissions from wildfire alone in severe fire seasons such as 2016.[13] Wildfire creates carbon emissions through direct burning followed by the decay of trees and other vegetation destroyed by the fire. Extreme fires can damage soils and impair future forest recovery, which leads to potential loss of future carbon sequestration from those acres impacted. The forest carbon sink is also diminished by conversion of forests to other uses like urban and exurban development. According to the U.S. Forest Service, the nation could lose as many as 34 million acres of forest to development by 2060.[14]

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PATHWAYS FOR FOREST CARBON MITIGATION

Maintaining a strong base of healthy and resilient forests is the key to a reliable forest carbon sink. Several pathways are available to state and local policymakers to advance forest carbon mitigation while leveraging other forest ecosystem services such as forest products, air pollution abatement, drinking water supply protection, habitat preservation, and outdoor recreation. In the aggregate, the pathways below will keep forests as forests, expand forest cover, and promote forest health and resilience.

AVOIDED CONVERSION ("KEEPING FORESTS AS FORESTS")

Protecting forests, including working forests, through acquisition in fee and conservation easement helps to protect and stabilize the forest carbon sink. Reducing land development in the U.S. by 13 million acres compared to a future higher development scenario could avoid the loss of approximately 40 million metric tons CO_2 of annual sequestration by 2050.[15]

REFORESTATION

Another pathway for mitigation is planting trees where native forest has been harvested or degraded by intense fire, disease, drought, or other disturbance and is not growing back rapidly, or at all. A 2017 study led by The Nature Conservancy, *Natural Climate Solutions*, projected that reforestation offers the single largest land sector pathway to carbon reductions. Another study found 20 million acres of land suitable

[8] https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf (page 6-102)
[9] Nowak, David J., et. al., Residential building energy conservation and avoided power plant emissions by urban and community trees in the United States, Urban Forestry & Urban Greening 21 (2017) 158-165.
[10] http://www.urbanreleaf.org/get-educated/benefits-of-trees
[11] U.S. EPA Greenhouse Gas Inventory 2010-2016.
https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf
[12] Forest Climate Working Group. 2015a. Expanding the Use of Wood in Buildings – Including Tall Wood Buildings – Helps Support Climate Preparedness and Mitigation. Supplement to Forest Climate Working Group Recommendations. January 14, 2015. 14 pp.
[13] U.S. EPA GHG Inventory 2010-2016
https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf
[14] https://www.fs.fed.us/research/publications/gtr/gtr_wo87.pdf (page 12)
[15] United States Mid-Century Strategy for Deep Decarbonization (2016)

Abandoned or marginal farmlands no longer used for agriculture could be covered with medium-sized trees within 50 years.[18]

for reforestation in the U.S. with potential to deliver an additional 48 MMt/CO_2e of annual sequestration if reforested.[16] Reforestation also rapidly increases soil carbon, another benefit that is still being fully integrated into carbon accounting.[17]

AFFORESTATION

There are lands suitable for replanting native forest where forest has not existed for decades, such as areas cleared and maintained for agriculture. Abandoned or marginal farmlands no longer used for agriculture could be covered with medium-sized trees within 50 years.[18] In some recent analyses, including *Natural Climate Solutions*, such lands have been included under "Reforestation" as a single pathway covering all tree planting activities on land currently or formerly in forest cover. The Forest-Climate Working Group does not advocate afforestation on lands that do not support tree canopy naturally, such as native grasslands. We also recognize the need to balance continuing availability of land for agriculture with opportunities to expand forest cover.

MANAGING FORESTS FOR INCREASED SEQUESTRATION

There are many ways in which forests can be managed to increase carbon sequestration, including carbon storage in wood products. Several forest management techniques increase the survival and enhance the growth of healthy trees that sequester the most carbon.[19] Examples of forestry practices that strengthen forests and enable them to sequester and store more carbon include fertilizing soils; extending forest rotations to let carbon accumulate; accelerating restocking; managing competition to enhance overall growth; removing diseased trees in favor of species that grow faster and less impeded; and protecting climate-adapted tree seedlings that are most likely to thrive.

MANAGING FORESTS FOR RESILIENCE

A range of forest management practices can increase forest resilience to forest stresses that are worsening with climate change, thereby reducing potential carbon emissions and loss of future sequestration capacity. These resilience-oriented practices include but are not limited to forest treatments designed to reduce the vulnerability of forests to wildfire, and practices designed to protect forests from disease, insects, and drought. In fire-prone systems, these practices include prescribed burning and thinning to reduce wildfire severity and irreparable

[16] https://academic.oup.com/jof/article-abstract/115/4/309/4599865 V. Alaric Sample,
[17] Nave LE, Domke GM, Hofmeister KL, Mishra U, Perry CH, Walters BF, Swanston CW7 Reforestation
can sequester two petagrams of carbon in US topsoils in a century. Proc Natl Acad Sci U S A. 2018 Mar 13;115(11):2776-2781.
[18] http://www.dec.ny.gov/lands/47481.html
[19] https://www.fs.fed.us/rm/pubs_other/rmrs_2010_ryan_m002.pdf

damage. In other systems, the primary opportunities to promote resilience include forest treatments and restoration practices that manage vegetation density and overall health. This will in turn reduce vulnerability to stresses like drought and pests that trigger increased mortality. In some cases, the forest practices that enhance sequestration (above) and increase resilience are overlapping. In many cases, forest owners and managers will want to plan these actions in tandem for the maximum carbon benefit.

URBAN REFORESTATION AND MANAGEMENT

Urban forests cover more than 130 million acres in the U.S. and deliver more than 10 percent of forest-based sequestration. Many cities and suburban areas have large tracts of vacant land and smaller fragments of land available to add to this forest base. Urban tree planting combined with enhanced tree maintenance can substantially increase urban forest sequestration and deliver additional carbon mitigation benefits through energy savings, especially if tree planting is targeted to areas suffering from urban heat island impacts.

FOREST PRODUCTS

Wood products from well-managed forests store forest carbon and offer lifecycle emissions benefits compared to alternative products that are more fossil-fuel intensive, such as aluminum and steel. It is important that carbon accounting for forest practices described above fully credits the carbon storage accomplished through wood products. This can be enhanced by helping landowners and managers better understand the storage potential in different wood products, and how they might optimize the carbon storage potential within the forest products carbon pool as part of an overall management strategy. Further, promoting forest product utilization can provide a market-based incentive to stimulate forest practices where they are needed to achieve forest health and resilience, such as thinning overstocked forests to reduce fire risk. This includes actions such as adjusting building codes to increase wood utilization, providing tax or other financial incentives for wood utilization in construction, and marketing promotions that highlight the climate change benefits of wood.

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02

State Finance For Carbon Mitigation

State and local governments can play an essential role in accelerating forest carbon mitigation. The foundation of this approach is identifying dedicated revenue streams that can fund several types of actions, including those described under "Pathways for Forest Carbon Mitigation" (page 3) in this Toolkit. This section of the Toolkit focuses on helping state and local governments answer this initial question: What funding streams could support this work?

Carbon Pricing

CAP AND TRADE

Cap-and-trade programs are government-mandated, market-based systems that set a limit on the total amount of greenhouse gas emissions allowed from various industries.[20] This cap is divided into allowances and distributed to companies within the relevant industries.[21] Companies that do not use all of their allowances can sell the remainder, or save allowances for future use. This ability to sell emission allowances provides companies with an incentive to lower their emissions and invest in cleaner forms of energy.[22] The cap progressively decreases, decreasing emission levels accordingly. Cap-and-trade programs have boasted high compliance rates, and are an economically effective approach to reducing air pollution.[23]

In the U.S., two cap-and-trade programs have been established to reduce carbon emissions and other air pollutants: (1) California (as part of the Western Climate Initiative) and (2) the Regional Greenhouse Gas Initiative (RGGI) comprised of ten Northeast and Mid-Atlantic States.[24]

Emission allowances under cap and trade can be distributed by the government for free or through an auction. Auction sale of carbon allowances under RGGI has collectively raised nearly $2.8 billion since the program's inception in 2005,[25] and California has collected $6.5 billion from sale of allowances since 2013.[26] California's first quarter auction of 2018 generated $700 million for the state.

[20] https://www.edf.org/climate/how-cap-and-trade-works
[21] Ibid.
[22] Ibid.
[23] Ibid.
[24] Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont
[25] https://www.rggi.org/docs/ProceedsReport/RGGI_Proceeds_Report_2015.pdf
[26] https://www.arb.ca.gov/cc/capandtrade/auction/proceeds_summary.pdf

Through a mechanism known as "California Climate Investments" administered by the California Air Resources Board, California has been actively investing a portion of these proceeds into programs that undertake forest carbon mitigation consistent with the forest mitigation pathways outlined above. This includes investment in forest conservation grants, fire risk reduction, and urban reforestation among other activities.

RGGI states have mostly chosen to focus use of carbon revenues in other areas like energy efficiency. However, there are some important examples where RGGI states have used auction proceeds to fund land sector activities, such as urban reforestation in Connecticut. Before pulling out of RGGI, New Jersey operated under a legislative mandate to spend a portion of RGGI proceeds on land sector activities. This potential future use of allowance proceeds to help fund land sector activities will be an important consideration for RGGI states in the future.

In addition to providing a source of funding for forest carbon mitigation programs, cap-and-trade legislation can create the legal framework to establish a forest offsets market. This unique financial incentive mechanism is explored farther below.

CARBON TAXES

A carbon tax is a fee imposed on the burning of carbon-based fuels (e.g., coal, oil and gas) in one or more of the sectors responsible for greenhouse gas emissions, including electricity, transportation, industry, commercial and residential, and agriculture.[27] A portion of these funds could be used for incentivizing forest carbon mitigation through the pathways outlined above.

The tax would ideally be charged "upstream"—levied at the point where fossil fuels are extracted or imported.[28] Fuel suppliers and processors pass this cost to utility companies, which then raise prices for consumers. This chain-effect creates a monetary incentive for both producers and consumers to reduce their reliance on carbon-based fuels, turn to renewable forms of energy, become more energy efficient, and, with the right legal framework, increasingly rely on the carbon sequestration services provided by forests.

States like Washington and Massachusetts have gained momentum in enacting carbon legislation, and several municipalities, including Boulder and Aspen, Colorado, have already instituted carbon taxes. Boulder's tax on the electric sector raises $1.8 million annually, while Aspen's tax on energy used by luxurious homes has raised nearly $1 million a year.[29]

[27] https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#electricity
[28] Ibid.
[29] https://www.energy.gov/sites/prod/files/2014/05/f16/csep_transcript_aspen.doc

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Initiative 1631 would put a $15 fee per metric ton of carbon content on large emitters, which would add an estimated $0.14 to the cost of a gallon of gasoline, rising annually.

Healthy forest investments are intended to **improve resilience** from climate impacts.

In Washington State, an initiative filed in March 2018 would levy a pollution fee on fossil fuels to support clean energy, clean water, forests, and other projects to combat climate change. Backed by a broad coalition of labor, environment, and tribal groups, Initiative 1631 would put a $15 fee per metric ton of carbon content on large emitters, which would add an estimated $0.14 to the cost of a gallon of gasoline, rising annually. The initiative specifies that 70 percent of expenditures would fund clean air and clean energy; 25 percent would support clean water and healthy forests; and 5 percent would be used for programs, activities, or projects to prepare communities for challenges caused by climate change and to ensure that the impacts of climate change are not disproportionately borne by certain populations. Healthy forest investments are intended to improve resilience from climate impacts. The Department of Natural Resources would develop procedures and criteria for the program, with funding made available for projects that create additions to carbon and resilience without supplanting other sources of funding otherwise available.

State Funding

The Forest-Climate Working Group recommends several finance models that state governments can adopt to keep forests as forests, create and expand forests through reforestation and afforestation, improve forest management, protect and create urban trees and forests, and increase forest product use. Many of these funding sources already exist and can be used and expanded to support natural climate solutions. Some are created through the legislative process, such as annual state appropriations from general revenues. States can also create new revenue streams through voter-approved ballot measures. There is a growing body of expertise in how to develop compelling ballot measures that win strong voter approval—more than $72 billion in state and local finance measures have been passed in the last 20 years according to The Trust

for Public Land, a national nonprofit organization. The Trust for Public Land and The Nature Conservancy have teamed to provide technical assistance to states and local governments on many of these successful measures, assisting with needs such as polling and the design of ballot measures.

The tables below illustrate several of the most common finance mechanisms for generating dedicated revenue for state-land conservation programs. Other state revenue sources include license plates, hunting and fishing licenses, hotel/motel tax, cigarette tax, state income tax, and oil and gas revenue.[30]

FIG. 1

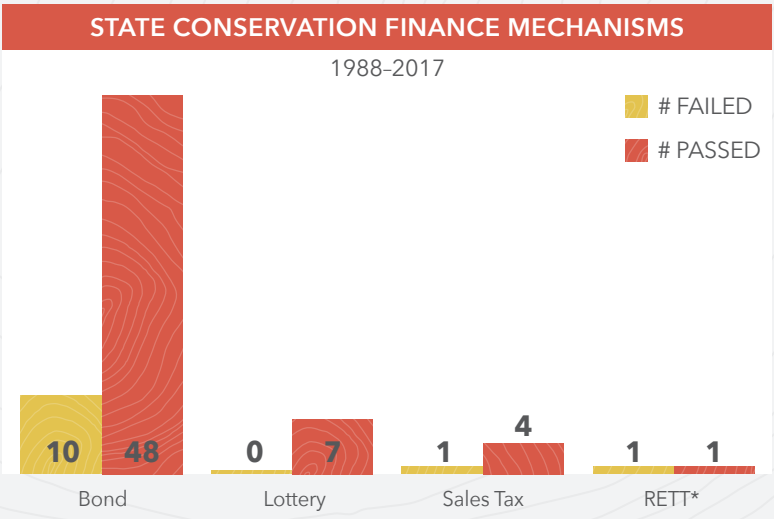
STATE CONSERVATION FINANCE MECHANISMS

Summary of ballot measures from 1988–2017

Mechanism	# Failed	# Passed	% Passed
Bond	10	48	83%
Lottery	0	7	100%
Sales Tax	1	4	80%
RETT*	1	1	50%

Source: TPL's LandVote database **RETT=Real Estate Transfer Tax*

FIG. 2



CASE STUDY: CALIFORNIA

The California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act was approved by voters on the June 5, 2018 state ballot. The Act authorizes the issuance of $4.7 billion in bonds for parks and conservation, critical to statewide efforts to use nature to sequester and store carbon. The new law also includes $25 million for improvements of native ecosystem resilience and adaptation to climate change and the enhancement of redwood forests to maximize carbon sequestration and build climate resilience.

CASE STUDY: NEW JERSEY

New Jersey has a long history of preserving open space and farmland. Between 1961 and 1995, New Jersey voters approved nine statewide Green Acres bond referendums. A 1998 referendum authorized the dedication of $98 million annually for a 10-year period from the state's general fund for open space, historic and farmland preservation. New Jersey voters subsequently approved additional referendums in 2007 for $200 million and in 2009 for $400 million.[31] In 1989, the New Jersey legislature enacted legislation authorizing counties and municipalities to establish a voter-approved Open Space Trust Fund supported by property taxes and provided for matching funds. Since then, all 21 counties and 233 municipalities in the state have established an open space tax by voter referendum. The partnership between the state and local governments has been critical. Voters demonstrated their collective strength again in 2014 by dedicating a portion of the Corporate Business Tax for preservation efforts. Preservation funding is 71% of 4% of collected tax until FY19, increasing to 78% of 6% in FY20 and thereafter. Annual amounts will vary based on tax collection.

> Since [1989], all **21 counties** and **233 municipalities** in the state have established an **open space tax** by voter referendum.

[30] For more information about other states' conservation programs, visit The Trust for Public Land's Land Vote database www.landvote.org. Also visit The Trust for Public Land's Conservation Almanac www.conservationalmanac.org,

[31] http://www.politickernj.com/64786/preserve-our-open-space-and-farmland#ixzz2S4USPjrQ

The [statewide forestry mill tax] ... cost the average homeowner a total of $26 a year, just shy of 1 percent of their total property tax bill.[32]

In 2017, New Jersey voters approved a constitutional amendment to ensure that damages in cases of environmental contamination paid by polluters are allocated to restoring wetlands and rivers and creating urban parks and greenspaces. These funds will prove critical funding for natural climate solutions projects.

CASE STUDY: WISCONSIN

The Wisconsin Legislature created the Knowles-Nelson Stewardship Fund in 1989 to preserve natural areas and wildlife habitat, protect water quality and fisheries, and create new opportunities for outdoor recreation. Grants are made to local governments and land trusts. The state sells bonds to support the fund payable from tax revenues. Since 1989, the Stewardship Fund appropriations have been adjusted several times from the original funding level of $25 million annually. Land trusts and local governments have also raised over $130 million to match grants through the Stewardship program. Together, the state and its partners under the Stewardship program have protected about 500,000 acres in 71 of 72 counties.

Until 2017, a statewide forestry mill tax was levied for the maintenance of 23 state forests, forest-fire prevention and suppression infrastructure, debt service on the Stewardship Fund, and other programs involving the health, economic and productivity of public and private woodlands. In the state's 2016-17 fiscal year, this tax raised $85.7 million for the state. The tax levied at 16.97 cents for each $1,000 of a property's value cost the average homeowner a total of $26 a year, just shy of 1 percent of their total property tax bill.[32]

To date the Stewardship Fund, in partnership with the federal Forest Legacy program, has purchased interests in approximately 259,435 acres of private, productive forestland that will be available for future timber production, public access and wildlife habitat, by attaining access, subdivision and sustainable forestry rights through working forest easements. Additionally, since 2007, a portion of Stewardship funding has been utilized by County Forests that have added more than 18,000 acres to their land management programs. Counties may apply for grants or loans for the purchase, development, preservation and maintenance of the county forestlands, as well as for economically productive forestry operations.

[32] https://www.wiscontext.org/forestry-mill-tax-has-deep-roots-wisconsins-logging-history


03

State Mechanisms to Incentivize Forest Carbon Mitigation

As demonstrated in Section II, states have several potential sources of funding that could be used to incentivize landowner adoption of practices that advance forest carbon mitigation. Section III of the Toolkit is intended to help states identify the most effective and efficient mechanisms to draw on these diverse funding streams, from general revenue and voter-approved finance measures (e.g., state-issued bonds) to revenue from a carbon tax or cap-and-trade regulation. The mechanisms in this section of the Toolkit offer different ways to allocate these funds to provide financial incentives to advance forest carbon mitigation.

In the case of forest carbon offsets, a unique mechanism for delivering financial incentives, cap-and-trade legislation can provide the legal structure for states to use compliance offsets to advance land sector mitigation. Compliance offsets are described at the end of this section after programmatic mechanisms.

It is important to note that 58 percent of U.S. forestland is owned by an estimated 11 million private forest owners, the majority being families and individuals that own relatively small tracts of land.[33] State and local governments need to look across the diversity of public and private actors they hope to engage in forest carbon mitigation, and understand the unique barriers and opportunities these different entities face in order to undertake these actions. The diverse matrix of potential policy mechanisms below offers potential for states to engage each of the categories of landowners they hope will participate. The ideal mix of mechanisms will be slightly different for each state depending on its unique context of land and people.

[33] Oswalt, Sonja N.; Smith, W. Brad; Miles, Patrick D.; Pugh, Scott A. 2014. Forest Resources of the United States, 2012: a technical document supporting the Forest Service 2015 update of the RPA Assessment. Gen. Tech. Rep. WO-91. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. 218 p.

Leveraging Existing Forest Programs

The most straightforward mechanism for delivering carbon incentives is to use existing grant and cost-share programs. The key is to identify state programs that naturally align, or can be expanded, to incentivize the most relevant forest climate mitigation practices for a given state's unique forest carbon mitigation opportunities.

As noted in Section II, California has used this approach successfully by directing funds from the sale of carbon emission allowances into California Climate Investments, which funds various state authorities to support forest-climate mitigation actions such as conserving forestland from development, reducing fire risk, and urban reforestation. Under state law, funds expended from carbon allowance revenues must have a measurable benefit on climate mitigation. To meet this requirement, California has created special application requirements and carbon accounting rules to assure that the state can assess the carbon benefits from the projects it funds through with cap-and-trade revenues.

Revenues to fund incentives through existing forest programs do not have to derive from a climate-specific funding source like the California Climate Investments. Any source of state funding as those detailed farther above could be used to support the most relevant work through these programs.

The most essential element of this model is to develop a rigorous, science-based process for specifying eligible forest practices based on the expected carbon benefit and quantifying the expected carbon mitigation benefits of these practices. This quantification will help to set appropriate payment rates for each practice, and help estimate the total carbon benefit delivered annually by each program.

Landowner Tax Incentives

One of the most attractive mechanisms for incentivizing actions by private landowners is the tax code. Studies have shown that some landowners view tax incentives more favorably than grants or cost-share payments, even when the net financial impact is the same. Many state and local jurisdictions are well positioned to provide different kinds of tax incentives for landowners to implement forest carbon improvements.

Forestland is sometimes taxed at its highest potential market value.[34] High taxes and other business expenses create an incentive for landowners to convert their forests to more profitable land uses or to harvest timber prematurely. Most smaller landowners receive financial

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returns infrequently, given the long time it takes for trees to grow to marketable sizes. The financial realities of conversion are sometimes overwhelming. For example, in the South, on average, short-term returns for land development hover around $36,000 per acre.[35] Tax liability can be the difference between whether a forest owner chooses to permanently conserve and manage their land, or sell it to a developer for immediate financial gain.[36]

The Forest-Climate Working Group supports the use of tax incentives to encourage these landowners to retain their forestland and invest in targeted management and restoration. State and local governments could strengthen existing tax incentives, and design new ones, to encourage sustained forest ownership and sustainable forestry practices.[37] Policy options include the following:

CURRENT USE LAWS

Current use laws assess and tax forested land based upon current usage, rather than its "highest and best" use, providing significant savings while encouraging owners to resist development pressures, accumulate stored carbon, and maintain sequestration and environmental co-benefits. Current use tax valuation programs are widespread across the U.S. today. All 50 states have policies calling for some sort of reduced property taxes for forest properties.[38]

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[34] http://www.duncanbrown.com/highest-and-best-use
[35] http://www.wri.org/blog/2011/06/property-tax-incentives-forest-conservation-us-south
[36] http://wisconsinwoodlands.org/wp-content/uploads/2014/12/Preserving-the-Family-Woods.pdf
[37] This paper focuses on state tax law. However, we recognize that the Federal Internal Revenue Code also
contains critically important provisions for maintaining forestland.
[38] State Property Tax Programs Promoting Sustainable Forests in the United States: A Review of Program Administration Michael A. Kilgore, Paul F. Ellefson, Travis J. Funk, and Gregory E. Frey. J. For. 116(3):257–265. https://www.srs.fs.usda.gov/pubs/ja/2018/ja_2018_frey_002.pdf

About half of all state current use programs require a forest management plan.

While these valuation programs have made a positive impact, their scale of implementation and overall effectiveness can be limited and several programs could use improvements.[39] In other cases, states are reluctant to implement such programs due to concerns about the loss in general revenue. The ability to dedicate carbon tax or cap-and-trade revenues to offset loss of tax revenue from current use enrollment would help to address this issue. Beyond limitations on enrollment, many programs provide low financial returns relative to the opportunity cost of development. Enhancing this financial benefit could increase enrollment, another case where additional revenue linked to climate mitigation could help.

To incentivize long-term preservation, half of state preferential property tax programs have minimum enrollment periods, usually of about 10 years, and over 80 percent have a withdrawal penalty.[40] These enrollment and withdrawal provisions are crucial in ensuring long-term carbon benefits. Many current use laws could be expanded to provide incentives for the long-term retention of forests, and could institute or expand a withdrawal penalty.

About half of all state current use programs require a forest management plan.[41] A few states have provided heftier tax credits for forests certified by the Sustainable Forestry Initiative or Forest Stewardship Council. These programs could be modified to specifically target the adoption of additional forest practices specific to carbon. To increase carbon mitigation on lands in the tax program, states could develop incentives for landowners to receive additional income tax credits for improved management strategies that optimize the carbon benefits of their forests.

CONSERVATION TAX INCENTIVES

Twelve states provide income tax credits to private landowners who voluntarily donate land or easements to a public agency or nonprofit organization for conservation purposes.[42] Some states allow landowners with little taxable income to transfer tax credits to another taxpayer and/or to carry the credit forward over a number of years. Several state tax incentives apply to fee simple donations as well as conservation easements.

When combined with existing conservation programs and the federal income tax deduction for donations of conservation easements, voluntary land donations are attractive and affordable options for forest landowners. States that do not currently offer tax credits for conservation easements could consider enacting these incentives, as they deliver clear carbon benefits. The following states currently have a statewide land conservation tax incentive program for donations of conservation land: Arkansas, California, Colorado, Connecticut, Delaware, Georgia, Iowa, Maryland, Massachusetts, Mississippi, New Mexico, New York, South Carolina, and Virginia.[43]

As an example, the Massachusetts Conservation Tax Credit was enacted in 2011. It offers $75,000 for landowners that donate their land for conservation and is capped at $2 million per year. Over six years, the program protected over 12,000 acres of significant conservation land, including prime forest and agricultural soils. So far, each $1 of state tax credits has leveraged $4.29 of private land donated value.

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[39] http://harvardforest.fas.harvard.edu/sites/harvardforest.fas.harvard.edu/files/publications/pdfs/Ma_LandUsePolicy_2013.pdf

[40] Ibid.

[41] Ibid.

[42] https://www.nature.org/about-us/private-lands-conservation/conservation-easements/what-are-conservation-easements.xml

[43] http://www.conservationeasementadvisors.com/overview/state.php

FOREST CARBON SERVICES INCENTIVES

Additional incentives could be designed specifically to increase the financial viability of carbon-beneficial forestry practices. Tax credits could be allocated to landowners engaging in afforestation, reforestation, and other forest management and restoration efforts with defined carbon mitigation benefits. Under this approach, policymakers could offer different property tax credits or deductions for different forestry practices, based on the relative improvements in carbon sequestration or a mixture of carbon and other environmental and economic goals. Calibration of the tax incentive would be tied to the scale of carbon benefit expected from any given practice, and the number of acres impacted by that practice.

These tax credits could come in the form of state and/or local property tax exemptions, as well, if landowners prove they have established and maintained the forest practice. For example, if a landowner were to demonstrate they planted a new forest on abandoned agricultural land, the landowner would receive a per acre afforestation tax credit the first year. This tax credit would be calibrated to the carbon sequestration rate for the type of forest that had been planted, and then receive another payment per acre in subsequent years by demonstrating survival rates of the planted seedlings and that the land is being managed for carbon benefits.

Policymakers should determine a process for calculating the annual aggregate carbon value of these tax credits so that they can communicate the benefits of this policy approach, in comparison to other emissions reductions efforts.

Carbon Incentive Programs

For some states, creating a new programmatic structure for forest carbon incentives could prove beneficial. Creating such a program offers a state the opportunity to build the carbon mitigation quantification and metrics into the programs goals and administration from the ground up. Such a program does not have to be concerned with how carbon mitigation might compete with other longstanding program goals, as why integrating carbon criteria into an existing program that was not created for this purpose.

Over six years, the [Massachusetts Conservation Tax Credit] program protected over 12,000 acres of significant conservation land, including prime forest and agricultural soils.

If carbon is not quantified on an acre-by-acre basis, transaction costs will be substantially reduced.[44]

Unlike an offset program, where carbon mitigation benefits are measured for each project and subject to detailed and often expensive reporting, carbon incentive programs are designed to measure progress at the program level. If carbon is not quantified on an acre-by-acre basis, transaction costs will be substantially reduced.[44]

Using this approach requires program administrators to be responsible for making accurate estimates of the carbon mitigation benefits of different practices on a per-acre basis, calibrated for the different forest types and physiographic settings in a given state. Landowners then become eligible to create practice-based contracts with the relevant state agency administering the program. A contract would specify which eligible practices will be undertaken over what duration, acreage and forest types to be included, and other relevant elements that define the carbon practices agreement. Payment to the landowner is based on the estimated carbon benefits of the practices in the contract over the term and acreage involved, using the state's quantification models, and payable annually if the specified activities are completed.

This model creates the potential to activate a much wider range of practices and landowner types than a forest offset program thanks to savings from reduced measurement and evaluation at the project level. Because these "supplemental" reductions under such a program are not designed to be sold in exchange for allowing additional carbon emissions, in contrast to a carbon offset, there is less demand for unit-by-unit emissions reductions accuracy. This creates important savings in verification costs, which in turn creates potential to achieve climate action goals at a larger scale across a broader range of landowners.

A program built on this model has been proposed repeatedly in the U.S. Congress, dating back to the development of federal cap-and-trade legislation. Most recently labeled the "Forest Incentives Program Act" and introduced by U.S. Senator Jeanne Shaheen (D-NH), the programmatic structure in this legislation offers one fully developed example of how a state might design and establish a forest carbon incentives program throughthe legislative process.

The Forest-Climate Working Group stands ready to work with state and local policymakers to help them design and successfully launch a new program to incentivize forest owners to conserve and manage their land for increased carbon sequestration. From our experience working on similar federal legislation, and our expertise in how to make such programs functional for landowner participation, we have developed the following program design principles for states to consider.

[44] https://nicholasinstitute.duke.edu/sites/default/files/publications/transaction-costs-and-forest-management-carbon-offset-potential-paper.pdf

PROGRAM DESIGN GUIDELINES FOR FOREST CARBON INCENTIVES

Dedicate Revenue Stream

Policymakers could create a legally protected dedication of carbon revenue for investment in the land sector, if the state has implemented some form of carbon pricing. Having a dedicated stream of revenue that is tied to a state's climate change regulation(s) would help with justification for establishment of a land sector carbon mitigation program. If a state does not have carbon-related revenue, other state revenue from one of the traditional sources described farther above could be dedicated for this purpose.

Establish Program Administration

The next step is to establish comprehensive program administration responsible for distributing financial incentives to forest owners. The program could be administered by forestry experts and professionals from environmental, energy and natural resources agencies. Program administrators would establish program rules and guidelines for landowners to apply for and receive incentive payments.

Specify Qualified Forestry Practices

The foundation of an effective program is to specify appropriate forestry practices that qualify for carbon mitigation incentives, and to develop an initial projection of the carbon mitigation benefit of each practice. These practices must be carefully identified and customized to the state's unique context of forest types and other biophysical factors, as well as existing forest practices regulations and customs. Each practice should be designed based on the summarized scientific literature and the experience of practicing forest managers, evaluated for the economic and environmental costs and benefits, and subjected to an evidence-based review of key policy and management questions.

Establish Payment Rates

Based on the delineation of eligible practices, and scientific assessment of the carbon mitigation benefit of each practice, program administrators would then establish initial payment rates for each forestry practice and rules for verifying that practices have been adopted and maintained.

Establish Contract Length Rules

Program administrators would need to determine appropriate rules on contract duration, so that meaningful and long-term reductions are achieved. The Forest-Climate Working Group recommends the use of renewable 15-year contracts for forest management and restoration

practices, and conservation easements for avoided conversion. However, states might choose to vary contract lengths for specific practices tied to the duration needed to accomplish the desired carbon mitigation outcomes.

Establish Rules for Reversals

Policymakers should create clear rules for dealing with intentional and unintentional reversals. Reversals occur when a landowner is unable to deliver the activities and therefore the anticipated carbon benefits specified in a contract. If an intentional reversal occurs, meaning that a landowner willingly failed to maintain the forestry practice for the contract period, the landowner should be required to repay the original incentive with a penalty. However, if the reversal was unintentional, such as the result of a major storm or fire, the Forest-Climate Working Group recommends that states elect to cover the loss of expected carbon mitigation from a carbon buffer pool established for this purpose at the program level.

The Forest-Climate Working Group recommends that states elect to cover the loss of expected carbon mitigation from a **carbon buffer pool** established for this purpose at the program level.

Incentivize Co-Benefits

Policymakers could build potential co-benefits of these practices into program design. Such co-benefits might include protection of waterways, increased biodiversity, or recreation access and amenities. States could use extra incentives to encourage landowners to pursue environmental co-benefits, such as:

1. Bonus ranking points for an application to the program;
2. An increased per-acre payment; and/or
3. Providing matching cost-share or technical assistance from other programs that favor that co-benefit.

Since the inception of California's program in 2013, 45 forest carbon offset projects[45] have generated more than 53 million carbon offset credits.[46]

Review Carbon Mitigation Benefits

Program administrators need to develop rules and processes for periodically truing up the estimated carbon mitigation benefit for each eligible practice, and identifying new eligible practices. This will enable the state to better calibrate payments based on performance and assess the carbon mitigation benefits achieved through the program. This learning and refinement process should be based on statistically sound field sampling and an assessment of the aggregate statistical effect across all enrolled acreage.

Forest Carbon Offsets (Compliance)

Cap-and-trade programs can help catalyze land sector mitigation by providing a legal framework for forest carbon offsets. A forest carbon offset is the reduction of emissions of one ton of carbon dioxide made to compensate for emissions made elsewhere. This reduction can come from either avoiding one ton of carbon emissions, or increasing forest carbon sequestration by one ton. Regulated industries under cap and trade can purchase offset credits from landowners and land managers to meet their emission reduction targets, providing compliance flexibility.

California has demonstrated how offsets can drive activity in the land sector. Since the inception of California's program in 2013, 45 forest carbon offset projects[45] have generated more than 53 million carbon offset credits.[46] However, California is the only U.S. state with an extensive forest carbon offset program. The 10 states regulated by RGGI have not successfully launched a forest carbon offset market because relatively low prices for emissions allowances have not provided financial incentive for covered entities such as utilities to purchase offsets.

For those states considering establishing a forest carbon offsets program, the Forest-Climate Working Group has established several key principles for offset markets that have strong environmental integrity and also encourages participation by private landowners.

ENVIRONMENTAL INTEGRITY

- **Additional:** Forest projects should be required to meet a carbon additionality test. Methodologies should be developed for determining baselines that are quantifiable and matched to project type.
- **Permanent:** The term "permanent" for forest carbon offsets should mean removal and/or storage of the subject carbon from the atmosphere for at least 100 years. Forest carbon contracts should assign clear obligation for reversals.

[45] https://www.arb.ca.gov/cc/capandtrade/offsets/issuance/arb_offset_credit_issuance_table.pdf
[46] Ibid.

> Forest projects should be required to meet a **carbon additionality test.** Methodologies should be developed for determining baselines that are quantifiable and matched to project type.

- **Quanti iable:** All carbon pools expected to significantly change should be quantified and reported. Carbon pools include live and dead biomass, soils, and harvested wood products. Field measurements and estimates for forest carbon projects and selected pools should be required to meet a specified benchmark for accuracy, to be reviewed and updated regularly over time using the best available scientific understanding.
- **Veri iable:** Third-party verification of reported amounts of carbon should be completed before they are registered for offset credits.
- **Leakage:** Internal leakage should be documented and addressed, which will usually be accomplished if the appropriate geographic management unit is enrolled. Standardized mechanisms should be developed to account for and address external leakage.
- **Sustainable:** It is important to ensure that forest management implemented as part of forest carbon projects is sustainable. A range of approved methods should be provided for landowners and project developers to demonstrate sustainability.
- **Equivalent:** Equivalence for forest-carbon offset projects with other offsets will be ensured if key elements of project design, including those detailed above, are adequately addressed.

ECONOMIC VIABILITY

- **Market Flexibility:** Allowing market flexibility for landowners and project developers to establish forest carbon contracts of different duration in response to market demand would be appropriate, provided that the environmental integrity of emissions reductions is not compromised. Clear rules should be established for replacing shorter-term credits so that environmental integrity is maintained, and contracts of varying duration should be standardized to allow them to remain fungible in offset markets. Market flexibility should also include a suite of options to enable obligated parties to cover the risk of reversals.
- **Measurement Standards:** A set of standardized tools to help determine which carbon pools will require measurement would mitigate compliance costs for landowners and project developers, and should be developed based on local/regional data. Measurement should not be required for carbon pools nearly certain to have increases.
- **Additionality Determination:** Development of a standardized methodology supported by robust data and tools to enable measurement of additionality would enhance accuracy and increase landowner participation.

04

Other State Mechanisms to Catalyze Forest Carbon Mitigation

State Land Management

State and local governments own large areas of forestland in virtually every state in the nation. According to the National Association of State Foresters, these entities own more than 82 million acres nationwide—almost half the amount of land in the National Forest System.[47] State-owned lands offer a unique opportunity for states to implement forest carbon mitigation practices, both to advance their climate-action goals and to provide a model for action by other landowners.

The U.S. Forest Service created a model for how states might seek to leverage their public lands for climate objectives. When it was seeking to increase climate mitigation and adaptation through the public lands under its purview, the U.S. Forest Service developed a National Roadmap and Performance Scorecard for the National Forest System. This performance management system and guidance structure remains in active use by the agency, helping each National Forest consider how it builds strategies and measures progress for integrating carbon mitigation and resilience to climate impacts through management and restoration actions into the overall program of activity.

> According to the National Association of State Foresters, [state and local governments] own more than **82 million acres nationwide.**[47]

States might consider a similar approach to help facilitate broad adjustments to land management that would benefit forest carbon mitigation. This process could begin by examining existing state land

[47] https://www.fs.fed.us/climatechange/advisor/scorecard.html

management policy and management plans on specific land units to assess whether the state is utilizing the same beneficial forest carbon mitigation practices that it might be trying to incentivize with private forest owners. For example:

> *Is the state promptly reforesting after harvest, and with species that are well adapted to future conditions? Are the state's harvest practices optimized for carbon storage and production of wood products, protection of forest soil carbon, and other variables? Has the state considered adopting a certification standard to help with identifying and implementing carbon-beneficial management practices? Is the state implementing restoration practices to reduce future carbon emissions from fire, pest infestations and other stresses?*

As one example of a progressive state policy that can help achieve these ends, New Jersey has adopted a "no net loss" policy for disturbance of forest on state land. That means that any project conducted on state land that leads to a loss of forest cover must be compensated by the state with an equivalent amount of replanting in another location. Many other states are adjusting state land management to align with the state's climate goals.

Finally, it is important to consider the role of public land as a showcase for climate mitigation practices. The Climate Change Response Frameworks[48], a shared effort among the U.S. Forest Service, state governments, and other partners such as nonprofits has helped to establish demonstration projects on public lands and to help others learn from them. States might consider developing similar technical assistance opportunities around particularly innovative or effective carbon mitigation practices adopted on state land.

Forest-Related Land Use Policies

State land use policy is a potential lever in two different ways: development regulations that impact forestland and forest practices regulations.

Maryland has provided a nationally prominent example of the potential for state land use regulation to slow the loss of forestland. Since the 1960s, Maryland has lost approximately 450,000 acres of forestland, with approximately 2.5 million acres remaining today.[49] Maryland's Forest Conservation Act, enacted in 1991 and subsequently amended, creates a system of required forest mitigation for development proposals that will lead to a loss of forest cover. Developers must gain approval at the county or municipal level for their proposals, with the requirement to mitigate

[48] https://www.forestadaptation.org/

[49] http://marylandreporter.com/2018/01/05/saving-md-forests-again-on-state-house-environmental-agenda/

Since the 1960s, Maryland has lost approximately 450,000 acres of forestland, with approximately 2.5 million acres remaining today.[49]

> Residential and commercial buildings in U.S. cities have typically been built using steel and concrete, both of which significantly contribute to **greenhouse gas emissions.**

75 percent of the area of forest that will be lost through a development that impacts intact tree canopy. Mitigation is accomplished through reforestation. This program has significantly slowed net forest loss in the state, from an annual rate of 8,600 acres prior to 2008 to an annual average of less than 2,000 acres since 2009.[50]

Forest practices regulations can also be a tool for influencing landowner actions that have carbon mitigation implications, such as high-grading working forestlands in ways that lead to short-term gains but long-term loss of productivity—including carbon sequestration storage. Massachusetts has forest practices regulations that offer one model for addressing such issues. The state has a strong set of Best Management Practices that require the approval of a Forest Cutting Plan that helps landowners understand the implications of the harvest plan that is being proposed.[51] This includes a check box above the landowner's signature that asks the landowner to specify whether their objectives are to maximize short-term revenue or create a long-term source of sustainable forest products and income. States have the opportunity to update Best Management Practices to help support forest practices that are beneficial to carbon mitigation.

Climate Technical Assistance

Landowners have many reasons to pursue forest practices that go far beyond the potential for carbon-related revenue. For some landowners, this is a simple sense of personal responsibility to address climate change. For others, the motivation is to maintain a healthy and

resilient forest to improve productivity, habitat, water supply, and other outcomes in the face of climate change. Matching different combinations and applications of forest practices to meet different mixes of landowner objectives and land management potentials requires expert technical assistance.

That is why states should consider different ways of providing climate technical assistance to landowners through delivery mechanisms such as the U.S. Department of Agriculture's Climate Hubs.[52] These regional technical assistance centers across the country were established to deliver applied science tools to public land managers and private landowners who are grappling with climate stresses on the lands they manage. These tools include vulnerability analysis, showing which tree species are best and least likely to thrive in a changing climate in a particular location. The Hubs work with state agency and extension educators to provide this information, and match it with a landowner-centered workbook approach to planning future management and restoration. States can help their landowners and public land managers access these federal technical assistance resources and integrate them into the existing suite of landowner services they provide. States should examine their existing technical assistance programs, such as state support for private landowner forest planning that might be required under a current use tax program, and explore ways to better integrate climate and carbon practice options and information into their services.

Forest Products

Every year, America's swelling population requires the construction and improvement of thousands of new homes and workspaces. Residential and commercial buildings in U.S. cities have typically been built using steel and concrete, both of which significantly contribute to greenhouse gas emissions. This puts urban development on a collision course with sustainability, unless builders find environmentally friendly alternatives to meet this construction demand. That is where wood products come in.

Responsibly harvested wood is one of the best materials for reducing carbon emissions and storing carbon in buildings.[53] In fact, each ton of wood used in place of steel and concrete reduces carbon emissions by about 7.7 tons.[54] If opportunities for wood buildings were maximized in all potential markets, the U.S. could see as much as 33 million tons

[50] Ibid.
[51] https://www.mass.gov/lists/state-forestry-laws-forms-and-instructions
[52] https://www.climatehubs.oce.usda.gov/
[53] http://www.tandfonline.com/doi/pdf/10.1080/10549811.2013.839386
[54] http://planwashington.org/blog/archive/washington-states-mass-timber-opportunity/

Each ton of wood used in place of steel and concrete reduces carbon emissions by about 7.7 tons.[54]

of carbon reduction and storage benefits annually, the equivalent of permanently shutting down eight coal-fired power plants.[55] Increased forest product usage also helps revitalize rural communities that rely on the forest economy and incentivizes investments in forest management. The Forest-Climate Working Group estimates that increased wood usage could result in up to $14 billion in economic benefits for the U.S.[56]

Today, new technology utilizing "mass timber" panels, cross-laminated timber, and other expansive wood-based building systems has allowed wood to emerge as a cost-effective and sustainable material for building construction.[57] However, the U.S. is lagging in the adoption of these new technologies, especially when compared to progress made in other parts of the world.[58] Barriers to adoption, such as antiquated building code restrictions, are often most effectively dealt with at the local level.

> The Forest-Climate Working Group estimates that increased wood usage could result in up to **$14 billion in economic benefits** for the U.S.[56]

State and local governments seeking opportunities to support climate mitigation and reduce carbon emissions could explore a range of policy approaches that encourage innovation in wood building construction. There are several policy options that encourage forest product usage, including:

PUBLIC AWARENESS PROGRAMS

Raising awareness about the benefits of forest products will help increase wood usage in the construction of buildings. This will avoid emissions from alternative materials, extend carbon-storage initiated in the forest, and reduce the embedded energy in buildings in the form of energy used to create the materials in the building. States could invest a portion of revenues raised by carbon pricing mechanisms, or other sources, into large-scale efforts promoting forest products.

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[55] Forest Climate Working Group. 2015a. Expanding the Use of Wood in Buildings – Including Tall Wood Buildings – Helps Support Climate Preparedness and Mitigation. Supplement to Forest Climate Working Group Recommendations. January 14, 2015. 14 pp.

[56] Ibid.

[57] Pingoud, K., J. Pohjola, and L. Valsta, 2010. Assessing the integrated climatic impacts of forestry and wood products. Silva Fennica 44(1): 155–175

[58] http://planwashington.org/blog/archive/washington-states-mass-timber-opportunity/

Organizations like Woodworks, a nonprofit that provides training about modern wood technology, have effectively educated builders, homeowners, architects and engineers about the benefits of forest products. It is estimated that current annual investments of $1 million in Woodworks have reduced overall emission levels by 3.6 million tons of CO_2 per year, through increased sequestration and avoided emissions.[59] State and local governments could expect similar impacts with investment in public awareness and education programs.

PROCUREMENT POLICIES

State and local governments could establish a procurement policy for government-owned and funded buildings, requiring building construction to use low-carbon materials. Implementation of such a policy could reduce carbon emissions from the building-construction sector by about 9.5 percent.[60]

FOREST PRODUCT RESEARCH

State and local governments could research new uses for wood in order to provide new wood product carbon pools to integrate into mitigation-focused management. This will have the additional benefits of helping keep American timber businesses competitive and foster new markets for landowners.[61] Supporting the development of new timber products will spur economic growth in rural America.

LOW-CARBON BUILDING CONSTRUCTION

State and local governments could establish a tax credit, deduction or exemption for commercial and residential building owners that use low-carbon materials in their construction projects. This could be part of any public/private partnership initiative to revitalize the state's infrastructure. This credit might be awarded upon proof of installation, structured similarly to credits provided for energy-saving installations like solar panels and geothermal heating systems. States could develop a listing of low-carbon building materials that qualify for this program, and offer tax credits commensurate with the carbon benefits of each product.

[59] Forest Climate Working Group. 2015a. Expanding the Use of Wood in Buildings – Including Tall Wood Buildings – Helps Support Climate Preparedness and Mitigation. Supplement to Forest Climate Working Group Recommendations. January 14, 2015. 14 pp.

[60] Ibid.

[61] https://www.forestfoundation.org/markets-for-family-forest-wood-products

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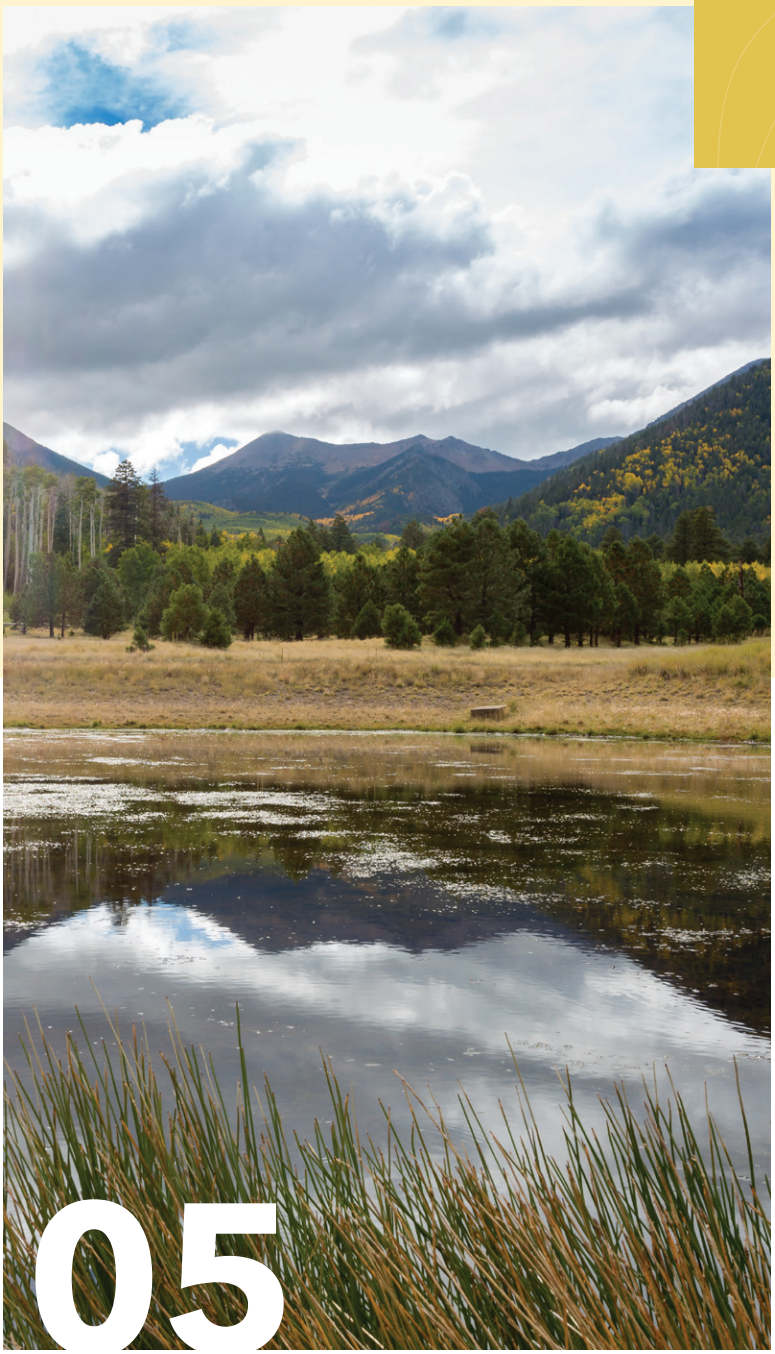

05

Leverage for State Finance and Policy

Voluntary Carbon Offsets

While some states will create their own offset markets, there is an opportunity for states to catalyze additional forest carbon mitigation by helping landowners engage in developing voluntary offsets.

There are many different offset markets, such as the American Carbon Registry, which offer protocols for the development of voluntary forest carbon offsets and a crediting system for certifying the carbon mitigation accomplished. These certified offsets can then be sold by the landowner to offset the costs of implementing carbon-focused practices, while generating new revenues that will help to sustain their ownership of working and natural lands.

Voluntary offsets can be considered to have a different net climate mitigation benefit from compliance offsets because their use is not tied to a legal obligation by the purchaser of the offset. The funds from the purchaser of a voluntary offset, based on some self-imposed goal for carbon mitigation such as corporate social responsibility, enable the landowner to achieve additional carbon mitigation above "business as usual."

Providing free technical assistance through state agencies to help landowners understand these markets has the potential to stimulate new voluntary offset project development.

Local Funding

Generating new funding through voter-approved local finance measures is a powerful tool to create additional revenue streams. Such programs, although primarily designed to achieve watershed, fire protection, or other environmental purposes, could be expanded to specifically target funding to projects with strong carbon mitigation benefits. The Forest-Climate Working Group provides a few examples that demonstrate how states can help catalyze this funding stream.

CASE STUDY: FLAGSTAFF, ARIZONA

The City of Flagstaff, Arizona presents a model of cooperation to fund efforts to improve forest management and avoid fire damage and flooding. Implementing these practices will also have significant forest carbon benefits, most notably reducing emissions from fire. In November 2012, Flagstaff voters approved a $10 million bond to thin forests and reduce wildfire threat to 11,000 acres in and around Coconino National Forest. The measure received strong support with 73 percent voting in favor. Recent fire events brought the issue to the forefront of public concern in the city. In 2010, the Schultz Fire burned some 15,000 acres of forest on the eastern side of the San Francisco Peaks ridge. Heavy rainfall followed soon after, causing extensive flooding to a housing subdivision. A similar event on the western side would cause catastrophic flooding and threaten the city's main surface drinking water supply. Additional funding and assistance was provided by the U.S. Forest Service and Arizona State Forestry, Northern Arizona University, the Grand Canyon Trust, local and national conservation organizations and local area fire districts. The individual cost of the bond to city taxpayers is approximately $25 a year on a $250,000 home.

The individual cost of the bond to city taxpayers is approximately **$25 a year** on a $250,000 home.

CASE STUDY: ILLINOIS

Illinois has authorized the creation of local forest preserve districts whose primary mission is to preserve open space, protect wildlife habitat, and provide passive recreation. However, these same forest preserves are preventing the likely conversion of these forests in a densely settled region—avoiding emissions and preserving future sequestration capacity from these forests. The districts are authorized under Illinois statute and may be created only through voter approval by a simple majority. Forest preserve districts are separate legal entities, generally coterminous with a county's boundaries. The county's elected officials—board of commissioners—also serve as the elected officials of the forest preserve districts, with the president elected

Since 1988, six forest preserves have passed 19 separate measures providing over $1 billion in new funding for land conservation.

from their peers. All forest preserve districts may levy a property tax for general operations purpose (limited to .06 percent of property value) and may also levy above this level for additional maintenance and operations, with voters able to seek a referendum on the higher levy. Finally, all forest preserve districts may submit bond questions to voters for land acquisition and capital improvements, subject to approval by a majority of voters. Since 1988, six forest preserves have passed 19 separate measures providing over $1 billion in new funding for land conservation.

CASE STUDY: MASSACHUSETTS

The Massachusetts Community Preservation Act (CPA) combines local enabling authority with a commitment of state funds to urge communities to implement a local property tax for parks and open space. This is another strong example of local funding helping to accomplish avoided forest conversion in service of carbon mitigation. Cities and towns are authorized to impose a surcharge of up to three percent on local property taxes to be used for open space, parks, affordable housing, and historic preservation. State matching funds are provided from a $20 surcharge on most recorded documents, including deeds of conveyance and mortgages. Each year a percent of state matching funds is divided among communities that have adopted CPA based on the total amount raised by the local open space tax. The state matches an average 20 percent of local funds depending upon the number of participating communities and the strength of the real estate market. To date, 173 cities and towns have adopted CPA, raising over $1.9 billion, leading to the conservation of 27,190 acres ad 1,950 outdoor recreation projects.[62]

Federal Funding

The Forest-Climate Working Group has outlined several federal government programs that provide significant funding for forest protection and restoration. Some key programs are highlighted below, but this is only a partial list of the many diverse authorities that can contribute to forest carbon mitigation.

> For [Fiscal Year] 2019, **31 states** have requested over **$100 million** to support almost **175,000 acres** of forest.

FOREST LEGACY PROGRAM

The U.S. Forest Service's Forest Legacy Program provides states and U.S. Territories with federal funding to help protect forestland. It can be utilized for working forest conservation easements as well as fee acquisitions. The program requires a minimum non-federal match of at least 25 percent of total project cost. Match can consist of state, local, or private funds, donated land value, and in some cases, project costs. A state enters the voluntary program by submitting an Assessment of Need (AON) to the U.S. Secretary of Agriculture for approval. These plans establish the lead state agency, the state's Forest Legacy project criteria, and areas within which proposed Legacy projects must be located. Each enrolled state has a Forest Legacy Program coordinator, housed within the agency designated in the AON to administer the program. Since its inception in 1990, Forest Legacy has helped to protect more than 2.7 million acres. Federal contributions of $805 million from the U.S. Forest Service have leveraged $977 million in non-federal cost-share. In federal FY2018, Congress provided $67 million for the Forest Legacy Program. For FY2019, 31 states have requested over $100 million to support almost 175,000 acres of forest.

FIG. 3

U.S. FOREST SERVICE LAND CONSERVATION 1996-2017

Program Name	Reported Acres		Reported Amount	
	Total	Annual Avg.	Total	Annual Avg.
Community Forest Program	11,402	543	$ 6,089,978	$ 289,999
Forest Legacy Program (FLP)	3,965,068	188,813	$833,941,843	$39,711,516
Grand Total	3,976,471	189,356	$840,031,821	$40,001,515

Source: The Trust for Public Land's Conservation Almanac Database

[62] http://www.communitypreservation.org/content/cpa-overview

COMMUNITY FOREST AND OPEN SPACE CONSERVATION PROGRAM

The U.S. Forest Service's Community Forest and Open Space Conservation Program, also known as the Community Forest Program (CFP), is a relatively new 50-50 matching grant program for local government, tribal, and local non-profit acquisition of forestland threatened by development. CFP grants are awarded nationally from funds already appropriated, which typically expedites the timeline from application to award. Grants are usually much smaller than those of Forest Legacy awards. For the pending FY2019 grant round, the maximum allowable award will be $600,000. Since its first grant round in 2012, CFP has provided more than 40 grants to support local forest protection in communities in 19 states and territories. Through grants issued to date, project partners leveraged $8.5 million in federal funds to secure $18 million in non-federal support. As a result of partnerships with land trusts, local governments and tribes, nearly 14,000 acres of private forestland have been or soon will be acquired to create new or expand existing community forests. In federal FY2018, Congress appropriated $4 million for the Community Forest Program, continuing a strong upward trend.

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ENVIRONMENTAL QUALITY INCENTIVES PROGRAM[63]

The Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to forest and agricultural producers to plan and implement conservation practices that improve the health of

[63] Annotated Summary of Existing Working Forest Conservation Initiatives and Programs, Prepared by Rick Cantrell, BlackBriar Environmental LLC, July 2017.

Since its first grant round in 2012, CFP has provided more than 40 grants to support local forest protection in communities in 19 states and territories.

Recent annual funding obligations have ranged from a high of $17.9 million in 2011 to $1 million or less in the years 2014 to 2017.

agricultural land and non-industrial private forestland. EQIP may also help producers meet federal, state, tribal, and local environmental regulations. Recent annual funding obligations have ranged from just over $1 billion in 2009 to $67 billion in 2017.

EQIP is well-aligned to help states leverage their investments in forest practices that increase forest carbon mitigation through forest health and resilience. Under EQIP, forest owners on eligible land with a natural resource concern on that land may apply to participate in EQIP. States offer a variety of EQIP funding opportunities to address priority local or state resource concerns.

Financial assistance payments through EQIP are made to eligible producers, to implement approved conservation practices on eligible land or to help producers develop Conservation Activity Plans (CAP) to address specific land use issues. Payments are made on completed practices or activities identified in an EQIP contract that meet NRCS standards. Payment rates are set each fiscal year and are attached to the EQIP contract when it is approved. Each CAP is developed by a certified Technical Service Provider, who is selected by the EQIP participant.

HEALTHY FORESTS RESERVE PROGRAM[64]

The Natural Resources Conservation Service Healthy Forests Reserve Program (HFRP) assists landowners, on a voluntary basis, in restoring, enhancing and protecting forestland resources on private lands through easements, 30-year contracts and 10-year cost-share agreements. The program is unique in that it has an explicit recognition of carbon sequestration as a goal for program funding. Specifically, the program provides payments for restoration and conservation easements that will "restore, enhance or measurably increase the recovery of threatened or endangered species, improve biological diversity or increase carbon storage."

HFRP was signed into law as part of the Healthy Forests Restoration Act of 2003, and was amended in the 2008 Farm Bill. Recent annual funding obligations have ranged from a high of $17.9 million in 2011 to $1 million or less in the years 2014 to 2017.

HFRP provides financial assistance in the form of easement payments and costs-share payments for specific conservation action completed by the landowner. To be eligible for enrollment, forestland must be private or tribal land, and the proposed practices by the landowner or tribe must increase the likelihood of recovery of a threatened or endangered species, improve biological diversity, or increase carbon sequestration.

[64] Ibid.

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Conclusion

State and local governments are to be commended for the leadership they have long shown in conserving forests and working to positively influence management and restoration across public and private lands. The goal of increasing carbon mitigation through forests is naturally aligned with these historic goals—healthy, resilient, and productive forests are ideal for advancing carbon mitigation.

Maximizing existing authorities and new climate policies and finance is a complex undertaking that can create great outcomes for the forest sector if done correctly. The Forest-Climate Working Group stands ready to work with state and local lawmakers to pursue the policy concepts in this document, from traditional strategies such as developing voter-approved finance measures to designing of new policies entirely customized to determining a jurisdiction's climate mitigation goals.

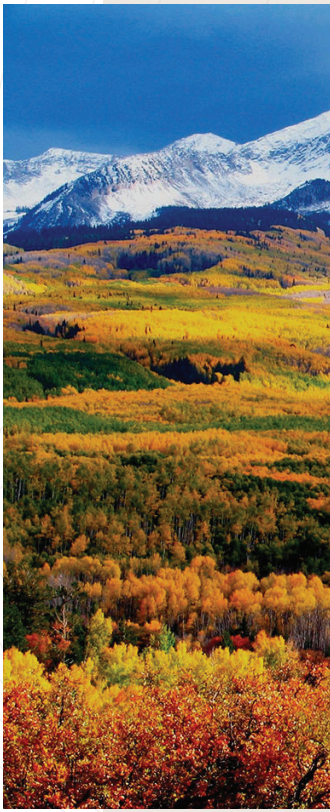
Healthy, resilient, and productive forests are ideal for advancing carbon mitigation.

Forests play

a critical role

in absorbing

carbon emissions.



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