

New England Conservation Pathways

A Survey of Emerging Conservation Finance Strategies



Highstead

Benjamin W. North and Spencer R. Meyer

About this Report

This working paper was written in preparation for the New England Conservation Finance Roundtable, held at the Harvard Center for the Environment on March 17, 2017. It will serve as a foundation on which to build promising strategies for advancing public and private finance for land conservation in the region in the coming years. Our goal for this paper and the Roundtable is to stimulate discussion, inspire collaboration, and advance new strategies for increasing the pace of land protection in New England. Highstead and its Wildlands and Woodlands Initiative partners are committed to providing new capacity to help regional conservation organizations incubate, iterate, and implement conservation finance approaches that make land protection possible. **As this is a working paper, the authors request that the report not be shared beyond those participating in the Roundtable at this time.**

About Highstead

Highstead is a regional conservation organization situated among the forests, fields, and waters of Redding, Connecticut. Since its founding in 1982, Highstead has been dedicated to conserving the landscape of New England through sound science, stewardship and conservation. Highstead is a major partner in the Wildlands and Woodlands Initiative (W & W), which calls for protecting 70 percent of New England's forest by 2060 to keep it permanently free from development. Highstead achieves its mission by advancing regional conservation partnerships, innovative conservation financing, Wildlands and Woodlands Science, conservation internships, and science-informed policy analysis.



Highstead

127 Lonetown Road, Redding CT 06896

www.Highstead.net

Table of Contents

Introduction	4
Conservation Finance Strategies	
Forest Carbon Offsets.....	8
Community Forests	22
Green Bonds	34
Real Estate Taxes	42
Sales Taxes	52
Corporate Sustainability.....	59
Water Quality Trading.....	66
Compensatory Mitigation.....	73
Summary of Strategies Examined	81
Additional Strategies to Consider	82
The Future of Conservation Finance in New England	83
Acknowledgements	84
References	85

Introduction

New England’s land conservation heyday is here. Never before has the conservation capacity been so deep and the imperative to ensure our forested landscape for future generations so great. The recent trends in land protection have been remarkable: over the past quarter-century an average of nearly two new properties were protected every day. Twenty-six percent of the region’s forests are now permanently protected from development. Yet public finance for land protection in New England has stalled while development pressure threatens to undue more than a century of our region’s great forest recovery (Figure 0.1).

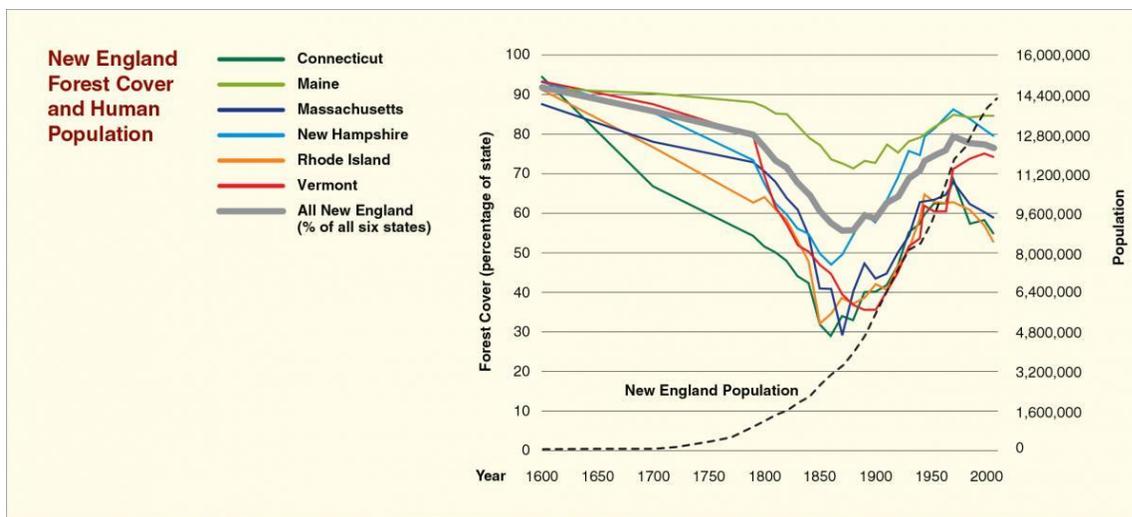


Figure 0.1 – New England’s Changing Landscape Since 1600. Harvard Forest 2010.

New research by Highstead shows that between 2004 and 2014, \$973 million in public funding—plus untold private funding—led to the protection of 1.4 million acres (Highstead, 2016). The evidence suggests, however, that it is time to embrace new strategies to attract additional sources of funding for conservation in New England. Public funding, from state and federal sources, has not provided a dependable stream of capital (Figure 0.2). For example, as of 2014, state spending for land protection declined 62% from its peak in 2008. Public funding for conservation remains vulnerable to prevailing economic conditions and is insufficient to provide a consistent basis for leveraging the magnitude of private investment needed.

Continuing to invest in land protection is essential to the health of New England’s community vitality, environment, and economy. The conservation community knows that investment in protection of natural assets and green infrastructure yields valuable economic

returns. For example, \$1 invested in land conservation will return \$4 of economic value in Massachusetts and as much as \$11 in Maine and New Hampshire (Trust for Public Land, 2012, 2013, 2014). Despite the major economic contributions of land protection, economic valuation of and subsequent investment in natural areas remains on the periphery of the economic agenda.

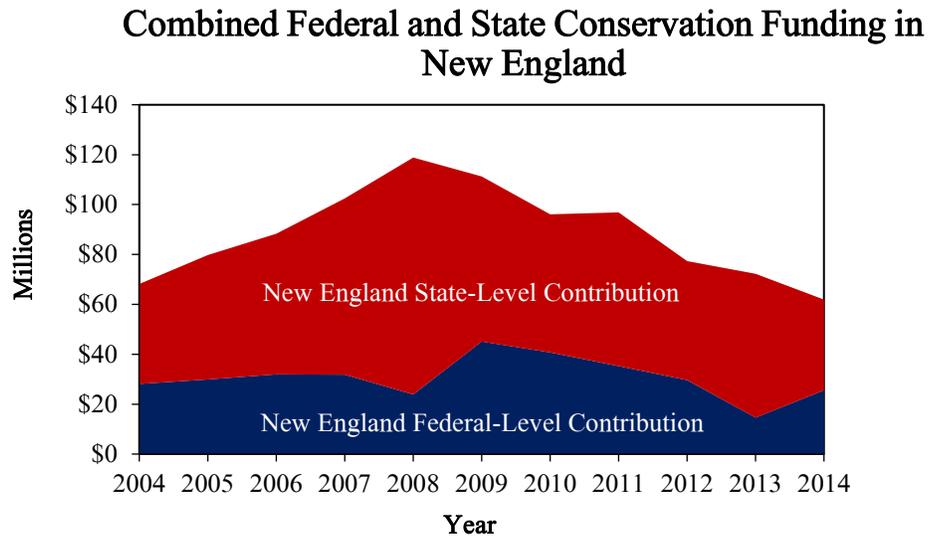


Figure 0.2 – Combined Federal and State Conservation Funding in New England (2004-2014), NRCS programs not included. Highstead 2016.

At the global and national scale, conservationists are developing finance strategies to protect water resources, advance sustainable production of food and fiber, mitigate climate change, and create new ventures that improve health and reduce poverty. Significant emerging opportunities to generate more funding for land conservation in New England include developments in ecosystem markets, fiscal policy reform, corporate sustainability initiatives, private capital, and community-based ownership models. This report investigates several nascent strategies with high growth potential to generate more public and private funding for land conservation in New England (Figure 0.3).

Interest from impact investors—those who seek both environmental and economic returns from their capital—is strong around the U.S., yet this source of conservation capital remains just a small niche source of funding. For example, in the last two years the Natural Resource Conservation Service (NRCS) has seeded innovative public-private partnerships with \$12.2 million to create impact investments models for conservation of forest carbon, pollinator habitat, agricultural soils, and water pollution mitigation. Impact investment partnerships

between private investors, banks, foundations, and public finance programs are developing, but access to private capital has not yet reached the mainstream.



Figure 0.3 – Conceptual map of conservation finance development phases, adapted from Credit Suisse 2016.

With its long history of conservation innovation, New England is poised to be a sandbox for new public and private conservation finance strategies. In 2006, The Harvard Forest convened some 40 experts to develop a strategy to finance the Wildlands and Woodlands vision, which was then focused solely on Massachusetts. That roundtable succeeded by producing clear, tangible policy and finance approaches to advancing land protection in Massachusetts. That roundtable led to a greater understanding of the investment needed to achieve the Wildlands and Woodlands vision in Massachusetts, and also outlined key opportunities for funding this vision. In 2010, Harvard Forest and Highstead published the Wildlands and Woodlands vision for New England, calling for permanently protecting 70% of the region’s forests through local community-driven conservation and the protection of large landscapes. In May 2017, Harvard Forest and Highstead will launch a renewed vision that calls for broadening the conservation of New England’s landscape through protection of wildlands, woodlands, farmlands and communities. Achieving that vision will require accelerating the current pace of land protection and will cost on the order of \$25 billion over the next several decades. It is time to develop a set of coordinated strategies to reverse recent trends in public finance for conservation and to accelerate private investment in our landscape.

There are numerous conservation networks in New England that will play a critical role in supporting the development of new conservation finance strategies. Among these networks,

the Regional Conservation Partnerships (RCPs) coordinate conservation action at a regional scale across multiple land trusts and conservation organizations. There are now at least 43 RCPs in New England. Collectively they have the ability to attract funding that would not otherwise be available. For example, the Jessie B. Cox Charitable Trust has been supporting RCPs through two programs: one that invests in organizational innovation for RCPs and another that directly funds the transaction costs associated with donated conservation easements and acquisitions.

Similarly, new regional partnerships are being supported through the Natural Resource Conservation Service's Regional Conservation Partnership Program (RCPP: not to be confused with the aforementioned RCPs). Through RCPP, NRCS awarded a consortium of organizations from all six New England states \$10 million to reduce nitrogen pollution and storm water in the Long Island Sound Watershed. In Maine, NRCS awarded the Maine Mountains Collaborative \$4.6 million to address fish and wildlife habitat at a landscape scale through purchase of conservation easements, innovative finance approaches to improved forest management, and fish passage restoration. These and other RCPP awards reflect the depth of conservation capacity in the region and demonstrate how effective partnerships can attract large-scale public funding for conservation on private lands.

Currently, there is a multitude of established, emerging, and prospective finance strategies to advance both public and private finance at national, state, and local levels. This report catalogs some of these strategies, provides case studies, and offers key lessons about how to effectively implement and expand these strategies across New England. And there are other strategies not addressed herein to consider. For example, there is growing momentum to make major infrastructure investments in the U.S., and it is up to the conservation community to show how major investments in natural infrastructure will address many of our growing urban, coastal, water quality, and climate change challenges. There is also growing interest in developing new insurance mechanisms that incentivize natural infrastructure solutions to mitigate climate-induced natural disasters.

Given the great capacity of the region's conservation organizations, the recent downturn in public funding for land protection, and a surge of interest in conservation finance, **the goal of this report is to stimulate discussion about how New England can finance the protection of its future landscape and to inspire regional partners to collaborate on advancing the most promising strategies.** It is time to bend the curve for conservation finance.

Forest Carbon Offsets

Conservation Target

The protection of forests that sequester carbon for mitigating greenhouse gas emissions.

Mechanism

Using finance from compliance and voluntary carbon cap-and-trade programs to fund land protection and forest stewardship.

Overview of Forest Carbon Offsets

Compliance carbon offset markets are rapidly growing domestically and internationally as a strategy for mitigating climate change by reducing allowable emissions set by a cap-and-trade program. Through cap-and-trade programs, regulators proportionally allocate carbon allowance credits to emitters in their jurisdiction who can buy and sell them based on their need to emit. Emitters may also choose to offset a portion (up to 8% in the California compliance program) of their emissions by buying carbon offset credits. Carbon offsets certify emissions reductions to compensate for exceeding the mandated emissions cap. In a voluntary carbon market, emitters may elect to buy carbon offsets to mitigate the effects of their emissions to fulfill corporate sustainability or marketing goals or in anticipation of future regulations. Since carbon emissions due to deforestation contribute an estimated 17% of all global carbon emissions (IPCC, 2007), policy mechanisms, such as cap-and-trade programs, have recently started to incorporate forests in reducing carbon emissions.

There are several widely accepted means of offsetting carbon emissions to compensate for exceeding regulatory emissions requirements. Forest carbon offsets are one type of offsets credits that can be purchased to satisfy regulatory compliance. Since the early 2000s, over \$6 billion has been committed globally to protect forests through emissions reductions programs including cap-and-trade programs with close to \$888 million of that being committed in 2015 alone (Ecosystem Marketplace, 2016). In 2015, forest carbon offset sales in North America totaled \$74.5 million with \$11.3 million of those sales through voluntary markets and \$63.2 million through compliance markets (Ecosystem Marketplace, 2016).

Currently, the dominant domestic market for carbon offsets is California's cap-and-trade program administered by the California Air Resources Board (ARB). Since its beginning in 2012, this cap-and-trade program has become the second largest compliance program in the world, after the European Union's Emission Trading System. As California's cap-and-trade program and its associated offset market continue to gain traction, it could pave the way for the

rest of the United States to establish and link similar programs at the state, regional, or national levels. Currently, the program is authorized through 2021, but many experts expect the program to be extended. New England has already begun to supply carbon offsets for California emitters; with 28 million acres of forestland readily available for timber management (New England Forestry Foundation, 2014) this region is poised to supply magnitudes more offsets for the domestic market (Figure 1.1). While carbon finance is attractive to landowners primarily as added revenue, some landowners and their conservation partners are using sales of carbon offsets to fund conservation easements to protect their land permanently.

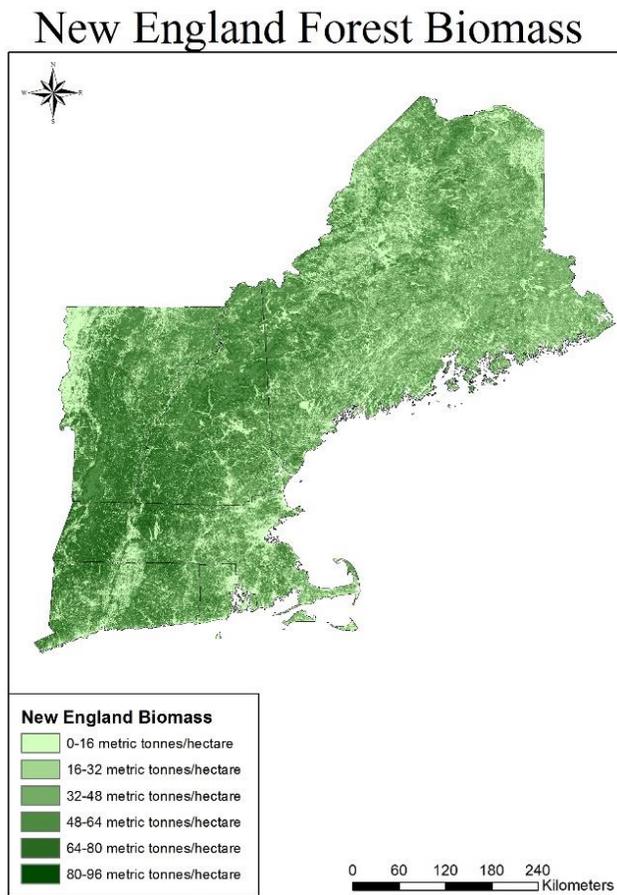


Figure 1.1 – New England forest biomass (metric tonnes/hectare). Data from Woods Hole Research Institute’s National Biomass and Carbon Dataset, 2000.

There are three accepted avenues of creating forest carbon offsets for the California compliance market: reforestation, avoided conversion, and improved forest management. Improved forest management (IFM) is the most viable forest carbon offset type for advancing land protection in New England and all projects in the region so far have been IFM projects. IFM

projects reward landowners for maintaining carbon stocks on their land that are above average regional levels. Landowners can be issued offsets, measured as metric tons of carbon dioxide equivalent, for carbon they store above the “common practice” threshold, which is established for all major forest types and ecoregions using regional forest inventory information from the U.S. Forest Service’s Forest Inventory and Analysis data. The common practice threshold, plus the carbon for which the landowner was issued offsets, becomes minimum on-site carbon stocking that must be maintained by the landowner for 100 years after the last year an offset was issued by the program to the project. Once landowners are issued offsets, they can continue to manage their land for forest products, as long as their on-site carbon stocks do not drop below the carbon volume last reported to the California program.

Though this long-term agreement acts as a form of conservation, precluding land cover conversion, some landowners and their conservation NGO partners have layered IFM projects with permanent conservation easements, which in many cases provides the landowner with additional revenue. Using revenues from carbon offsets to fund conservation easements, where the easements might not be otherwise fundable, is a strategy that provides strong potential for increasing land protection in New England, particularly for large working forests. Developing a forest carbon project generally requires no upfront costs to the landowner, but the project developer collects a portion of the credits and payment for the verification, brokering, and inventory of the sale upon successful completion of the project.

In New England, seven completed IFM projects have issued offsets. Six of those completed projects have produced credits for California’s compliance market and one has produced credits for voluntary carbon offsets markets (Katadhin Iron Works Ecological Reserve in Maine). The six completed compliance forest carbon offset projects in New England yielded an estimated average of \$137 of revenue per acre and generated \$25 million in total revenue in their first year of offset sales. So far, The Climate Action Reserve (CAR), the American Carbon Registry (ACR), and the Verified Carbon Standard (VCS) have listed 17 IFM projects in New England with at least three additional unlisted IFM projects in development in the region (Figure 1.2).

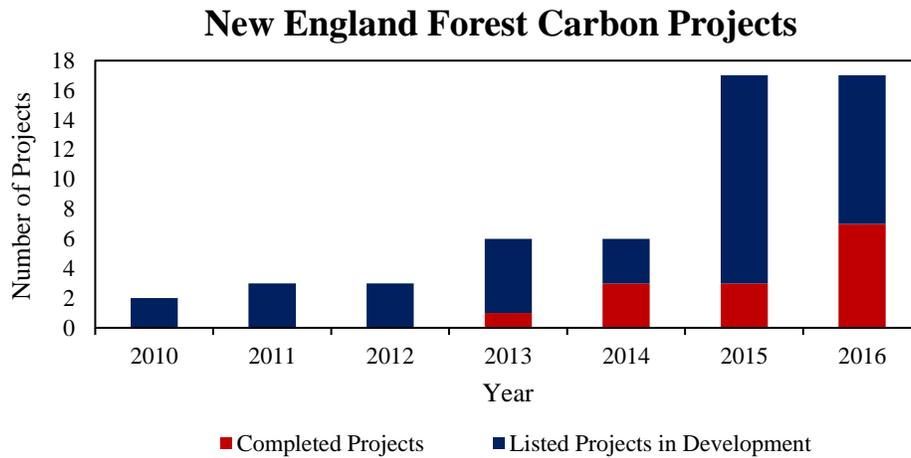


Figure 1.2 – Cumulative forest carbon offset projects in development or completed in New England. Data compiled from Climate Action Reserve, Verified Carbon Standard, American Carbon Registries, California Air Resources Board, and private discussions, December 2016.

These third-party carbon offset registries, CAR, ACR, and VCS oversee the registration of carbon offset projects and verify standards are met (americancarbonregistry.org, 2016). As a result, these registries provide an additional layer of quality control in the development of carbon offsets eligible for carbon markets such as California’s cap-and-trade program administered by the California Air Resources Board (ARB). In California, after the listing, development, and verification of projects through a carbon offset registry, the ARB then approves and releases the offset credits for sale to the California cap-and-trade market. New England forest carbon projects through the California cap-and-trade program have occurred so far in Maine, New Hampshire, and Massachusetts.

The 17 IFM projects in New England cover an area of over 652,521 acres. Of those acres, 457,352 acres represent projects in development while 195,169 acres represent completed projects. These 17 projects have an estimated total revenue potential in the first year of offset sales of over \$101 million with an estimated \$25 million of those revenues already realized through completed projects (Figure 1.3).

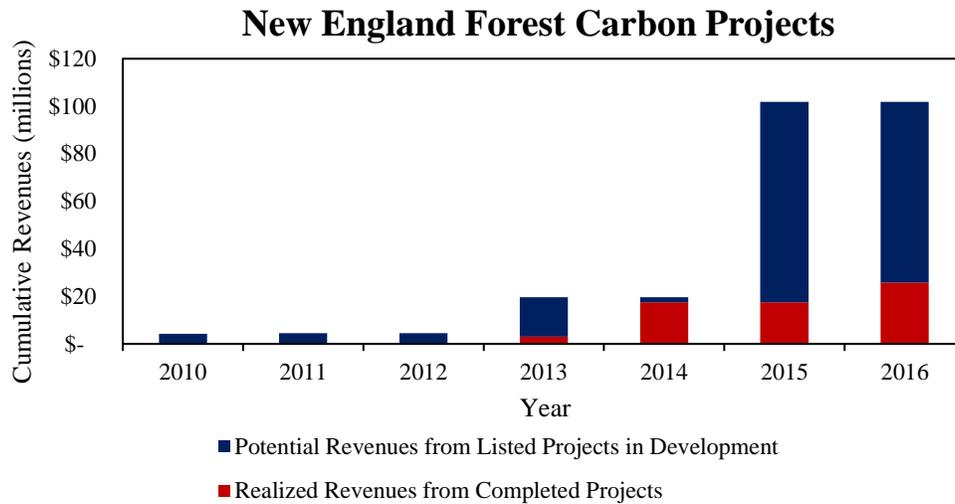


Figure 1.3 – Estimated cumulative forest carbon offset revenues in New England from first year of offset sales. Estimates of acreage and revenues of New England forest carbon projects calculated with data from the California Carbon Dashboard (mean annual price per offset), the ACR, CAR, and VCS offset registries (acreages and dates of all listed projects in New England), and the California Air Resources Board (number of credits issued and dates for completed projects), December 2016.

IFM projects in the Northeast also produce an estimated additional \$5-10 per acre annually after the first year of offset sales through forest carbon storage in excess of the new baseline (Jenkins, 2015). These subsequent offset sales could generate substantial additional revenue over the 100-year life of each project assuming the continued growth of the carbon offsets market. While scientific debate remains as to the long-term efficacy of carbon offset programs for achieving emissions reductions, carbon offsets are already providing a market for ecosystem services that some landowners are using to advance their conservation objectives. At present, New England conservationists have only just begun to utilize the vast potential that forest carbon in the region might provide for funding conservation with the future development of regional, domestic, and international carbon markets.

There are still many challenges that carbon markets face in this relatively early stage of development, but the carbon offset expertise and supply of compatible working forests in New England has led to a growing number of fundable projects in the region. For well-stocked forests, carbon offset revenues are in addition to regular timber harvest revenues making them a natural partner for investor-led working forests and conservation-focused landowners alike. Opportunities for carbon offset projects on smaller forests (i.e., less than 5,000 acres) are possible but costs of implementation, particularly where forest inventory data do not already

exist, can be prohibitive. A number of firms are seeking ways to aggregate smaller landowners into financially feasible projects.

With the first project completed in 2013, the IFM project market for New England is still in its early stages of development; the trends from these projects provide us limited—but useful—insight into their future development. In 2015, the number of IFM projects listed in New England on ACR, CAR, and VCS showed a dramatic increase (Figure 1.3). This increase was mainly prompted by a change in the 2015 forest carbon offset protocol, which increased the common practice threshold (i.e. the minimum baseline carbon stocks require for a project). Landowners and project developers rushed to “list” projects in advance of this protocol change. Regardless of the impetus, the increase in listed projects in 2015 shows that forest owners in New England are becoming increasingly conscious of the opportunities to generate carbon revenue from their land.

The continued growth of forest carbon offset projects in New England faces many challenges, notably the uncertainties surrounding the renewal of the policy supporting California’s cap-and-trade program scheduled to end in 2021. Also, in order for carbon offsets to be available to more landowners, a strategy for aggregating individual landowners must be developed. Aggregating forest carbon projects allows multiple small landowners to participate in producing and selling forest carbon credits together, whereas currently the primary participants in the forest carbon market are individual large landowners. The development of aggregation would also make forest carbon projects more viable in parts of New England where forests ownerships are more fragmented, but no less valuable from a carbon perspective. Partnerships between landowners and conservation organizations, such as the Regional Conservation Partnerships throughout New England, may become catalysts for aggregation. Many IFM projects have been completed on land already protected by conservation easement, but several innovative strategies are now emerging. The following three case studies are examples of these innovative strategies to use carbon offset revenues to protect additional acreage.

Forest Carbon Offset Markets Case Study #1

Farm Cove Community Forest and West Grand Lake Carbon Projects

Grand Lake Stream, Maine

Case Study Key Facts

Project owners	Downeast Lakes Land Trust Lyme Timber
Carbon project developer	Finite Carbon Corporation
Project verification organization(s)	Rainforest Alliance, Environmental Services Inc., Ruby Canyon Engineering, Forester's Co-Op
Regulating agencies	California Air Resources Board Climate Action Reserve
Project size	Farm Cove: 19,118 acres West Grand Lake: 19,552 acres Total: <u>38,670 acres</u>
Year of project completion	Farm Cove: 2013 West Grand Lake: 2016
Total number of verified emission reductions and/or removals after buffer deduction	Farm Cove: 229,402 credits West Grand Lake: 484,167 credits Total: <u>682,713 total credits</u>
Profit for Downeast Lakes Land Trust from initial sale of credits (net of fees, buffer pool, and revenue sharing with partners)	Farm Cove: \$1.5 million West Grand Lake: \$2.8 million Total: <u>\$4.3 million</u>
Time to project completion	Farm Cove Project: 4 years (2009-2013) West Grand Lake Project: 3 years (2013-2016)

Significance

This pair of projects, led by the Downeast Lakes Land Trust in Maine, includes the first project in the United States to create and sell forest carbon credits to a compliance carbon market. The second of these projects shows how carbon revenues from one property can be leveraged to acquire additional forestland, which in turn generates carbon revenue on its own to advance land protection.

Discussion

The Downeast Lakes Land Trust (DLLT) initiated discussions with Finite Carbon Corporation in 2009 to begin developing forest carbon offset credits on DLLT's Farm Cove Community Forest. DLLT and Finite together sold their first credits from 19,118 acres of the 27,080-acre Farm Cove Community Forest in the California cap-and-trade market administered by the California Air Resources Board (ARB).

While this project—the first IFM project in the U.S.—took nearly four years to complete, similar projects now averages about 12 to 16 months (Finite Carbon, 2015). To begin the process, DLLT elected to list the project with the Climate Action Reserve registry, which gave DLLT formal approval to commence the development of carbon offset credits in partnership with Finite Carbon. The two partners then worked together to conduct extensive inventory and other due diligence work leading up to verification and issuance of credits from ARB.

Through the sale of carbon credits from the Farm Cove Community Forest (FCCF) in 2013, the DLLT generated a profit of \$1.5 million after removing costs for registration fees, buffer pool (i.e., a reserve of credits to insure against inadvertent carbon emissions from natural disasters), and Finite Carbon's share. The DLLT then used \$1.1 million of these profits toward the cost of purchasing an option to buy a conservation easement on nearby 21,870-acre tract of forest known as the West Grand Lake Community Forest (WGLCF) from Lyme Timber Company (DLLT, 2016). Lyme Timber had purchased the property in 2008 as an investment, with the intent of being an interim owner so DLLT could eventually complete a conservation transaction. Interestingly, Lyme Timber used \$13 million in federal New Markets Tax Credits (NMTC) financing toward the purchase of the WGLCF. The NMTC provides a tax credit to lenders who invest in low-income communities for economic development purposes. In late 2012, DLLT transferred its option for the easement to the State of Maine, which then purchased the easement from Lyme Timber using primarily Forest Legacy Program and Land for Maine's Future grants. DLLT and Lyme Timber negotiated a deal to jointly develop a carbon project on this new property. DLLT was the primary beneficiary of the revenue share of these credits and

DLLT assumed the long-term obligation to maintain the project in compliance. As a result of this project, DLLT netted roughly \$2.8 million, which they used to purchase the WGLCF, along with additional public and private grants, from Lyme Timber.

DLLT expects to be able to sell additional carbon credits on each of the two properties as the forest grows and produces carbon in excess of the new baseline agreed to in the two IFM projects. DLLT may also be able to sell additional carbon credits through the voluntary market generated from a portion of the property that was excluded from the first IFM project. Voluntary offsets are a generally more viable option for smaller tracts of land with lower development costs and lower production thresholds, but voluntary offsets sell at lower prices than compliance offsets. DLLT plans to use a portion of the revenues generated from its additional forest carbon offsets projects to endow the required 100-year maintenance and stewardship plan for the WGLCF.

The successful acquisition of the WGLCF in July 2016 using proceeds from the sale of forest offset credits demonstrates that carbon credits can create revenue on unpurchased lands for their acquisition and protection with the assistance of a willing seller. This project also includes the generation of forest carbon revenues on land trust owned lands to bridge the funding gap for protecting new land. Due to the successes of these forest carbon projects, the DLLT will likely include carbon offsets as a source of funding to compliment future capital campaigns for large land acquisitions.

Forest Carbon Offset Markets Case Study #2

Forest Society of Maine Project, Maine

Case Study Key Facts

Project Partners	Conservation Forestry; Appalachian Mountain Club; Forest Society of Maine
Project stage	Evaluated by Finite Carbon, but project has not yet been inventoried.
Project status	In development
Acres	Forested acres: 3,800 Total acres: <u>4,300</u>
Registry	Will be listed through the Climate Action Reserve

Project significance

This project, involving a partnership between a private landowner and multiple organizations, uses forest carbon offsets to help finance and repay a loan used to close a funding gap for protecting a high-value conservation target. This project exemplifies how forest carbon offsets assessed before a transaction can provide returns to repay debt and cover future management costs used for land acquisition and protection.

Project summary

This project encompasses 3,800 forested acres of a 4,300-acre parcel on Silver Lake in Maine and includes significant silver maple floodplain and extensive riparian area. At project inception, the land was owned by Conservation Forestry LLC, a timber investment management organization (TIMO) with sizeable ownership in Maine. The property had previously been identified as a high-priority conservation target by state biologists and conservation organizations, and a strong consensus exists that the property should be managed as an ecological reserve. Because of the property's biodiversity significance, it was not ideal for a Forest Legacy grant, which is best suited to land that will continue being managed as a working forest. Given that a number of traditional state and federal funding sources were neither suitable nor available and that a reserve easement typically costs more than a working forest easement, project partners were challenged to identify adequate funding for this project. Therefore, in late 2015, the Forest Society of Maine (FSM) approached Finite Carbon to see if the land was viable for a forest carbon project to cover the remaining gap in funding – nearly a quarter of the total project cost. Conservation Forestry had previously listed the project as an ARB IFM project, but had not developed the project.

In 2015, Forest Society of Maine (FSM) developed an innovative partnership with the Open Space Institute (OSI), Appalachian Mountain Club (AMC), Finite Carbon, and the landowner to design a project that uses carbon offset revenues to cover the cost of protecting the land, while offering market price to the landowner and giving the conservation organizations the level of protection they seek. FSM acquired the option to purchase the land from Conservation Forestry, but later assigned this option to AMC, who then purchased the fee ownership from Conservation Forestry in January 2017. FSM and OSI each contributed toward the total acquisition cost, including for the conservation stewardship fund, using a combination of individual donations, foundation grants and a combination grant/loan from OSI. AMC then donated a conservation easement on the property to FSM. The IFM carbon project, currently in development by Finite Carbon, FSM and AMC, will generate an estimated \$1.2 million to the

landowner at initial issuance, most of which will pay back the portion of OSI’s contribution that was structured as a loan.

The excitement among partners and funders generated from incorporating forest carbon offsets to help finance the deal also helped to attract additional funders. As a result, the partners raised sufficient funds to provide the appropriate protection (i.e., reserve status) for the land by using carbon revenue. This forest carbon project provides a novel strategy for protecting new conservation land in that it relies on projected earnings from forest carbon offsets to pay back a loan used to initially finance the purchase this forest property.

Forest Carbon Offset Markets Case Study #3

Unnamed Forest Carbon Project, New Hampshire

Case Study Key Facts

Partners	Unnamed Land Trust Private landowner
Carbon Project Developer	Finite Carbon
Registry	American Carbon Registry
Status	Project listed Currently under development
Acres	Project acres owned by Land Trust: 7,000 - 8,000 Project acres owned by private landowner: 1,600 Total project acres: <u>8,600 - 9,600 total acres</u>

Project significance

This project could be the first in the United States to aggregate multiple landowners (a land trust and one private landowner) into one improved forest management (IFM) carbon offset project, and will lead to the protection of new land through the creation of a conservation easement on the private landowner’s parcel. This project sets an important precedent not only for aggregating multiple landowners into a carbon project, but also for leveraging the carbon on one landowner’s land to purchase a conservation easement on another landowner’s property.

Project summary

This project involves a private landowner and a land trust in New Hampshire that owns 17-18,000 acres in fee around Lake Winnepesaukee, NH. About half of that land is under a heavily restricted harvest management plan. However, 7,000 -8000 acres is harvested forest that is viable for an IFM forest carbon project. Finite Carbon was initially approached about a carbon project several years ago by the land trust and a private landowner partner, a family that intends to contribute about 1,600 acres to the carbon project. The family otherwise would not have been able to independently conduct a forest carbon project due to the size and stocking of their forest, so they partnered with the land trust to make a more viable project for both entities. The private landowner first suggested the idea of this aggregated project but the land trust took on an increasing role of moving the project forward.

The major difficulty with aggregated projects comes with the 100-year commitment to managing the property that all parties mutually agree upon. As long as the project is initially created as a single project, the number of entities involved is not a concern to the California Air Resources Board. Since 2013, the ARB protocol explicitly allows aggregation projects, but none have been done to date. The project relies on two legal mechanisms to ensure the carbon offsets will be maintained mutually by both parties over the 100-year life of the project. First, the land trust will acquire a conservation easement on the land owned by the private landowner. The easement will ensure that the same standards are kept across both ownerships and permanently protects the private landowner's land, which was not previously protected. Second, the land trust and the private landowner will sign a contractual operating agreement to both maintain the management practices associated with this forest carbon offset project. This way, one landowner cannot become responsible for maintaining carbon stocks for which the other landowner was issued saleable credits.

The land trust could independently develop a viable carbon offset project themselves. However, by including the private landowner in the project, it increases the viability of the project for the land trust and gives them additional acres under protection. For the private landowner, this opportunity to produce and sell forest carbon offsets would not be feasible without aggregation. Future aggregation projects will require multiple landowners and their partnering conservation organizations to have adequate education and support for the project. The revenues produced for both entities involved in this deal are proportional to the amount of carbon they have contributed. This project has been appraised by Finite Carbon and listed with the American Carbon Registry, but is still under development. The next steps for this project are for Finite Carbon to conduct an inventory of the lands and then for the credits to be issued by the

California Air Resources board. The project serves as a precursor for forest carbon project aggregation where multiple landowners can incorporate their lands into a single project to increase their feasibility and scale while protecting private land under conservation easement. This strategy of aggregation will make carbon finance accessible to magnitudes more landowners beyond the large-scale landowners who currently can already take advantage of the market.

Increasing Funding for Land Conservation through Forest Carbon Offsets

Major success factors

- Landowners and carbon offset developers have been willing to invest the time and money required to assess the feasibility of developing carbon projects with little precedent or guidance.
- New England has the organizational infrastructure and carbon expertise to complete complex conservation projects involving forest carbon offsets.
- Large forest tracts in Northern New England, typically greater than 4,000 acres, have been the most prevalent locations so far to conduct forest carbon offset projects though aggregation may alter this trend.
- A strong California market for carbon offsets has driven landowners to consider selling carbon alongside their usual timber harvesting regimes.

Factors of replication and scalability in New England

- Carbon offsets can raise funds for conservation organizations in-house on existing lands to create more funding for conservation.
- Enabling small landowners to participate in forest carbon projects, potentially through project aggregation.
- Regional Conservation Partnerships (RCPs) and land trusts could serve to facilitate and anchor aggregation projects. There are approximately 400 land trusts in New England and 43 RCPs currently covering an area greater than 60% of New England.
- The creation of templates and standards, similar to those created for conservation easements, could contribute to the growth of forest carbon offset projects by reducing due diligence, inventory, and stewardship costs.
- A continuance of the California carbon market beyond 2021, or the adoption of national or regional programs will be required to scale up carbon financing that can drive additional land protection.
- Educating the public and policy makers on why they should support putting a price on carbon will help expand and develop carbon cap-and-trade programs.

- Streamlining the compliance process, as well as building capacity of organizations that carry out the verification, sale, and monitoring of forest carbon projects, would increase the replicability of forest carbon projects.
- Decreasing landowner concern of the 100-year commitment and perceived reputational risk of offsetting polluters in far-away places would help increase interest in forest carbon projects.

Community Forests

Conservation Target

Protection of forests to provide economic, social, and ecological benefits directly to local communities.

Mechanism

Community-based ownership of a sustainably managed forest that is permanently protected under a conservation easement.

Strategy Summary

The use of town-owned lands has existed in New England since the 1630s, when town proprietors established villages with common lands for cultivation, grazing, and timber felling (McCullough, 2015). Since then, town forests have been created in New England for a variety of purposes including church lots, school lots, and watershed protection (McCullough, 2015). The tradition of town-owned forests in New England now serves as a foundation for an emerging management model for locally owned forests called *community* forests. Town forests typically do not have permanent protection and many of the benefits both monetary and non-monetary go unrealized by the community. Community forests, on the other hand, provide a new approach for communities to gain more benefits from their forestland and permanently protect the conservation and natural resource values of the forest. By making community forests more financially self-sustaining through increasing timber and other natural resource revenues and through the creation of multi-town community forests partnerships, this strategy may attract funding from greater and more diverse sources such as economic development programs.

There are four main criteria that define a community forest (Community Forest Collaborative, 2007):

- 1) Members of the community are actively involved in forest management decisions.
- 2) The community earns direct monetary and nonmonetary benefits from the forest.
- 3) The ownership of the forest can be directly through the municipality or a community-based organization on behalf of that municipality.
- 4) The conservation values of the forest must be permanently protected, usually through a conservation easement.

In New England, community forests are increasingly being used as a strategy to generate more funding for conservation. Community forests may buffer and connect existing conserved land while stabilizing ownership of working forests. From 2000-2016 there were at least 39 community forests created in New England, permanently protecting over 103,000 acres (Figure

2.1). Community forests range in size from 65 acres to 33,000 acres (Figure 2.2). From these data there is at least one community forest in each state besides Connecticut and Rhode Island (Figure 2.3). The figures below show the dramatic growth and the diversity of sizes and locations of community forests created in New England since 2000.

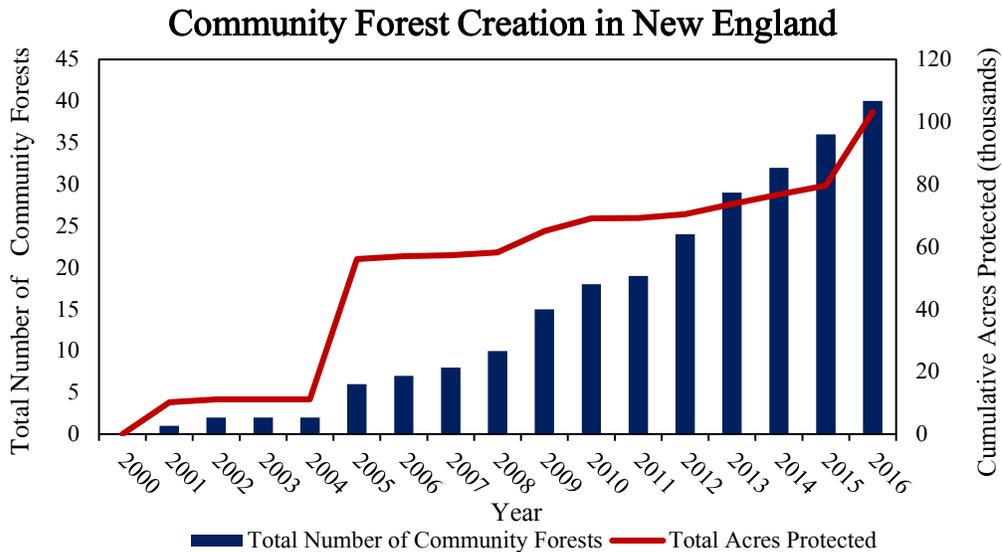


Figure 2.1 – Community forest creation in New England. Created with data provided by the Northern Forest Center, Open Space Institute, Trust for Public Land, and internet searches of community forest management plans produced by towns, December 2016. Note: Many unprotected town-owned forests existed prior to 2000 and are not included here.

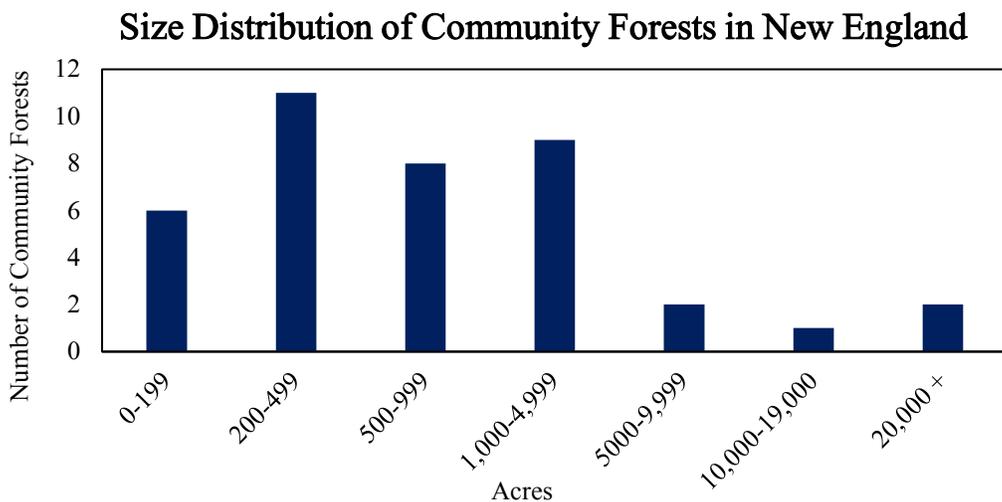


Figure 2.2 – Size distribution of community forests in New England. Data provided by the Northern Forest Center, Open Space Institute, Trust for Public Land, and internet searches of community forest management plans produced by towns, December 2016.



Figure 2.3 – Map of community forests in New England. Data provided by the Northern Forest Center, Open Space Institute, Trust for Public Land, and internet searches of community forest management plans produced by towns, December 2016. Figure created by Brian Hall, Harvard Forest, December 2016.

A recent inventory conducted in Vermont determined that there are greater than 68,000 acres of town-owned forest across the state with only 21% of them permanently protected (MacFaden, 2015). New Hampshire is currently in the process of conducting a similar inventory of their town forests. In New Hampshire, Vermont, and Maine, 0-2% of existing forests are town-owned (Harvard Forest, 2016). However, in Massachusetts, Connecticut, and Rhode Island, 5-8% of existing forests are town-owned, suggesting that a larger opportunity may exist in these states to convert existing town forests to permanently protected community forests. The creation of community forests on existing unprotected town-owned land may provide an opportunity to protect these lands at lower cost, as they have already been acquired by the town, through conservation easements while increasing the benefits those forests provide to the surrounding communities. Despite the relatively low percentage of New England’s forests currently being town-owned, community forests are an important strategy specifically for unlocking funding for the protection of New England’s town-owned lands, which can protect existing town-owned lands or purchase new lands for protection as community forests.

While community forests provide many nonmonetary benefits, such as cultural preservation and community development, an opportunity exists to expand the economic development component of community forests by incorporating more and diverse revenue sources into property management. Financially self-sustaining community forests may have greater success in accessing a wider range of funding from economic development programs and debt financing, garnering more support from those less interested in the non-monetary or indirect benefits of protecting forests, and also creating more revenue for community forest expansion.

Monetary benefits generated from a community forest can come from timber harvests, tourism, recreation, education programs, and a variety of other sources. Revenues from community forests so far have mainly come from timber harvests, which provide inconsistent cash flows and primarily seasonal jobs. Incorporating additional and diverse revenue sources into forest management will bolster the revenues and jobs created by community forests throughout the year. This approach could also increase the indirect revenue created by community forests to businesses in the surrounding community. Some examples of non-timber harvest revenues include Hereford Community Forest in Quebec leasing portions of its land to hunting and mountain biking clubs, Randolph Community Forest in New Hampshire leasing a portion of its land for commercial maple syrup tapping, and the Farm Cove and West Grand Lake Community Forests in Maine selling forest carbon offset credits, gravel, bear baiting leases, and permits for wreath and bough tipping. The table below demonstrates a few examples of the diverse opportunities to incorporate additional revenue sources onto community forests, which can vary based on the size and location of the forest and the interests of the community (Table 2.4).

Several funding sources and organizations have strongly influenced the creation of community forests in New England. Two grant programs specifically established for funding community forests have contributed to funding many of the known community forests in New England. In 2012, the U.S. Forest Service created the Community Forest and Open Space Program, which has provided \$2.8 million in grant funding for nine community forest projects in New England so far. Since this federal program requires 50% matching funds, several state-level grant programs administered through the Land and Community Heritage Investment Program (NH), Vermont Housing and Conservation Board, and Land for Maine's Future have paired well with these federal grants. The Open Space Institute's Community Forest Fund has provided funds to support the creation of 15 community forest projects in New England since its creation in 2010. The Trust for Public Land has also contributed funding to the creation of 14 community forests in New England. Both the Trust for Public Land and The Northern Forest Center have played instrumental roles in community engagement and capacity building for the creation of

community forests in the region. The New Markets Tax Credit, a federal program created to support economic development in distressed areas, has provided a total of over \$15 million in subsidized loans to support the establishment of two large community forests in rural areas of Maine and New Hampshire. The creative use of the New Markets Tax Credit to fund these projects suggests that community forests may have an opportunity to access more funding from economic development programs and debt-financing by strengthening the economic development component of community forests.

Revenue type	Revenue sources
Lease	<p>Existing: Commercial syrup production, mountain biking trails, all-terrain vehicle or snowmobiling areas, bear baiting, and hunting areas</p> <p>Potential: ropes courses, summer camps, horseback riding areas, adventure races, outdoor equipment rental stations, archery ranges</p>
Permit or direct payment	<p>Existing: selective timber harvesting, limited development, gravel, wreath and bough tipping</p> <p>Potential: educational programs, non-timber forest products, camping areas, sport guides, firewood, craft wood, landscaping plants</p>
Credits	<p>Existing: Forest carbon offset credits</p> <p>Potential: Water quality trading credits, mitigation banking credits</p>

Table 2.4 – Examples of potential revenue sources for community forests.

While larger community forests in northern New England (VT, NH, ME) may more readily support economic and community development, several community forests have relied on multi-town partnerships. These may serve as models for the southern New England (MA, CT, RI) region, with its more fragmented landscapes, to create larger community forests or community forest networks with greater economic, ecological, and social impact. The West Fairlee Town Forest and Brushwood Community Forest in Vermont were the first community forests to form a contiguous conserved area across two municipalities. The Cooley-Jericho Community Forest in northern New Hampshire has been the first community forest to create a

partnership where a land trust owns and manages the forest on behalf and in partnership with four nearby towns. Land trusts, Regional Conservation Partnerships, and other conservation organizations will continue to play a key role going forward in facilitating the creation and expansion of community forests, especially those involving partnerships across multiple municipalities.

Since many unprotected town-owned forests likely exist in New England, the continued creation of community forests could transition these lands to permanent protection under conservation easements at low cost while enhancing the benefits these forests provide to the surrounding communities. While community forests have become established as a strategy to fund conservation in New England, enhancing the economic development component of community forests and further developing multi-town community forest partnerships may attract greater and diverse funding sources.

Community Forests Case Study #1

Randolph Community Forest, New Hampshire

Case Study Key Facts

Project developers	Town of Randolph Fuller's Sugarhouse LLC of Lancaster
Location	Randolph, New Hampshire
Project size	Total syrup tapping lease area: 723 acres (7% of area) Total timber harvest area: 8,060 acres (79% of area) Total community forest area: <u>10,200 acres</u>
Date of tapping lease agreement	July 2016
Current status of maple syrup tapping	Sugar shack in construction and first taps to be installed Spring 2017.
Estimated average annual revenues earned by town	Timber harvest revenues: \$20,000 Commercial tapping lease revenues: \$27,000 Total annual town revenues: <u>\$47,000</u>
Estimated annual syrup tapping revenues	\$677,000 (Full production with available trees)
Jobs created by maple syrup lease	4-6 full time jobs (near term)

Project Significance

The Randolph Community Forest sold a lease for commercial maple syrup taps in 2016 to create a revenue source that augments timber harvesting. By adding another revenue source on a portion of this property, it allows this community forest to become more compelling as an economic and community development tool.

Project Overview

The Randolph Community Forest (RCF) in Randolph, New Hampshire was created in 2001 with the primary motivation to stabilize ownership of these 10,200 acres of forest under local control. Over the first 10 years, the RCF paid for its own management costs by generating over \$200,000 in timber harvest revenues (Town of Randolph, 2016). In 2012, the RCF generated sufficient timber harvest revenues to also begin paying the town an annual sum of \$5,000 as payment in lieu of taxes (PILT) (Town of Randolph, 2016). The RCF has never spent town tax money for its acquisition or operations (Town of Randolph, 2016). However, as of 2013 only 798 acres or 9.9% of the timber management area had been accessed for harvesting (Town of Randolph, 2013). The long-term goal for the revenues produced by this community forest are to first pay its management costs and PILTs to the town, and then for reinvestment into the property (Town of Randolph, 2013). The RCF also created a revolving forest account through special state legislation to reinvest revenues generated by the community forest on long-term projects instead of having to await approval on an annual basis for spending these revenues, which cannot provide funds dependably for long-term projects.

Since the RCF is now financially self-sustaining through timber harvest revenues by paying its own management costs and PILT to the town, the establishment of additional revenues from diverse sources on the RCF can create excess revenues for reinvestment and stewardship. As the RCF and other community forests begin to provide more compelling examples of financially self-sustaining and eventually profit generating models, this approach could attract more funding for the creation and expansion of community forests throughout New England.

Discussions of adding an additional revenue source to the Randolph Community Forest began in 2014 when a commercially viable stand of maple trees for syrup tapping was identified on the property. A public meeting provided a venue to propose the idea of syrup tapping on the community forest and to hear public comments. The town then conducted a cost-benefit analysis, which supported the decision to lease a portion of the community forest for maple syrup tapping and production. In early 2015, the town approved an amendment to the Randolph Community Forest management plan to create a 15-year commercial lease for maple syrup production.

In July of 2016, the Randolph Community Forest and Fuller's Sugarhouse LLC, one of two bidders, signed the lease agreement. The lease included rights to tap maple trees on 723 acres of 10,200 total acres of the community forest. The RCF is now supplementing their timber harvest revenues with lease revenues from maple syrup tapping, which are then reinvested in the community forest. Since only 7% of this community forest's total area is currently allocated for maple syrup production, there is flexibility expand the syrup tapping area, or to manage for additional revenue sources.

The 723-acre sugar bush includes over 27,000 trees currently mature enough for tapping and over 41,000 additional younger trees that can be tapped once they mature. A sugarhouse is in the process of being built on private property adjacent to the forest and 18,000 taps are expected to be active by spring of 2017. By the third year of operation, there are expected to be close to 30,000 taps in operation with \$1 in leave revenue per tap. The maple syrup operation will create 4-6 full time jobs in the near term and more as additional maples mature. Fuller's Sugarhouse will invest approximately \$1.5 million for the equipment and facilities to produce maple syrup from the RCF. Since the price of a gallon of pure maple syrup sold by this company is \$65.95 and the average yield per tap for Fuller's Sugarhouse is about 0.38 gallons (fullerssugarhouse.com, 2016) we estimated that revenues from tapping on the Randolph Community Forest would yield \$677,000 annually to Fuller's Sugarhouse at full production with the current stand of 27,000 available trees. The annual revenues will likely increase over the course of the lease as more trees mature and become available for tapping.

Also the RCF will earn an estimated \$27,000 annually, at full production with currently available trees, from the maple syrup lease, which equates to more revenue than the estimated \$20,000 earned annually from timber harvesting revenue. In total the RCF will earn an estimated \$47,000 in annual revenue from timber and taps. While surplus funds for conservation will be quite small initially, it shows that community forests can sustain themselves through their own economic activity, while providing the myriad benefits of open space to community members.

Since maple syrup producers often lease public and private land for their operations, maple syrup production may pair well with community forests as an economic activity with relatively consistent revenue flow and low ecological impact. Private landowners often have hesitation in encumbering their property with a lease agreement as it may make the property more difficult to sell. Community forests do not have this same limitation with regards to lease agreements as they must always remain protected as forests in the ownership of the town. Also businesses may prefer to sign leases on community forest lands as the opportunity for renewal of

the lease is likely to be higher on these lands, whereas private forests are more prone to changes in ownership.

With the expansion and creation of community forests in New England, comes new opportunities for communities to protect their open space and environmental services, while generating revenue from timber management and non-timber products.

Community Forests Case Study #2

Cooley-Jericho Community Forest, New Hampshire

Case Study Key Facts

Project Developers	Ammonoosuc Conservation Trust, Town of Easton, Town of Franconia, Town of Landaff, Town of Sugar Hill
Funding sources	U.S. Forest Service Community Forest and Open Space Program, The Open Space Institute, New Hampshire’s Land and Community Heritage Investment Program, New Hampshire Conservation and Heritage License Plate Program, Davis Conservation Foundation, Fields Pond Foundation, McIninch Foundation, private donations, Town of Easton, Town of Franconia, Town of Landaff, Town of Sugar Hill
Location	Easton, New Hampshire
Project Size	843 acres
Project Completion Date	September 2013
Total Land Value Cost	Approximately \$850,000

Project Significance

The Cooley-Jericho Community Forest is the first community forest partnership involving investment from four towns. Multi-town community forest partnerships may provide a means to create larger community forests and/or community forest networks especially in areas where land has much more fragmented ownership. A multi-town community forest may also

attract more funding for conservation while allowing projects to have increased economic, social, and ecological impact.

Project Overview

The Ammonoosuc Conservation Trust (ACT), a nonprofit land trust, purchased the 843-acre property that became Cooley-Jericho Community Forest (CJCF) in September of 2013 in partnership with four nearby towns. ACT played an instrumental role in coordinating the development of this community forest with widespread public input. Although this property only lies within the town of Easton, it is contiguous with White Mountain National Forest, and surrounding towns supported its creation for the community and economic benefits it would provide to the greater area. This community forest notably provides recreation and education opportunities accessible to surrounding towns, and also protects the viewshed for these towns. . In addition to other sources of funding, each of these towns invested equal shares of \$5,000 towards the purchase of the community forest with the total purchase price being approximately \$850,000. While the initial investment by the four towns is nominal, towns may continue to invest in the CJCF through work such as building a parking lot, which one has done, providing materials for trail building, and expanding the size of the community forest. Over time, the timber harvest revenues and the avoided costs of community services had this land been developed will vastly repay the investment to create the CJCF. After paying the management costs on the property, CJCF will provide net revenue to the towns proportional to their investment.

In 2012, the U.S. Forest Service Community Forest grant program—a new source of capital for community forest creation—awarded \$372,000 for the creation of CJCF after ranking the project as its top funding priority. A total of nine projects in New England have been funded from this program from 2012-2016 with an average grant of \$306,000 per project. The CJCF received the highest priority for these funds due to CJCF's emphasis on community engagement, its natural resource values, and its role as a buffer for the contiguous White Mountain National Forest. The Open Space Institute, NH Land & Community Heritage Investment Program, NH Conservation and Heritage License Plate Program, Fields Pond Foundation, David Conservation Foundation, and the McIninch Foundation and nearly 100 individual donors contributed the remaining \$458,000 to purchase and permanently protect the CJCF.

ACT now owns the property and manages the forest on behalf of the communities through the managing group, which includes representatives of each of the four towns, an ACT trustee, executive director, and a member of the ACT Lands Committee. Additionally the

committee may have representatives from key user groups such as skiers, mountain bikers, foresters, and educators. The CJCF provides an example of how multi-town partnerships can successfully create and manage a community forest through the facilitation of a land trust or other conservation organization. Further developing multi-town community forest partnerships could increase the economic, social, and ecological impacts of community forests and as a result attract more funding for conservation from increased stakeholder and organizational involvement.

Increasing Funding for Land Conservation through Community Forests

Success Factors

- The RCF had a commercially viable area for maple syrup tapping on its property while some community forests in New England may not.
- The RCF did not use debt-financing to fund its creation and therefore was able to pay for its management costs through subsequent timber harvest revenues.
- The RCF is a relatively large community forest (10,200 acres), which allows for increased scale of revenue generation from timber harvests and maple syrup tapping.
- The CJCF was a top priority for state and federal grant funding as it was contiguous with White Mountain National Forest and functioned as a buffer. Community forests that connect large tracts of previously conserved lands are likely to be most competitive to receive grant funding from public and private sources.
- Ammonoosuc Conservation Trust, a regional land trust acting to coordinate this multi-town partnership was critical in mobilizing support and governing the CJCF.
- The CJCF project attracted substantial external funding, allowing these four towns to acquire it with little capital (\$5,000 each), which facilitated cooperation across towns.

Opportunities for Scalability and Replicability

- Community forests provide an opportunity to protect lands that would not otherwise qualify for state or national level funding programs.
- Community forests can be created across a broad range of sizes and management regimes. However, as the size increases revenue from the forest often scales up.
- Existing town forests that are not permanently protected provide an opportunity to convert these lands to permanently protected community forest at relatively low cost.
- The community forest model may be implemented successfully on more fragmented forest tracts through multi-town partnerships.

- Community forest projects have the potential to attract funding from more economic development programs and debt-financing especially if additional sources of revenue can get incorporated onto community forests.
- Community forests with greater economic development impacts can provide a more compelling reason for land protection to those who do not fully appreciate the nonmonetary or indirect benefits of land protection.
- Financially self-sustaining community forests have the potential to direct profits towards advancing conservation and land protection in their respective town.
- A multi-town approach can allow for economies of scale, diffusion of costs, and protection of forests as ecological units not limited by town boundaries.
- Organizations such as the Northern Forest Center can improve capacity building and community engagement in economically distressed areas that often lack sufficient human capital.
- Incorporating additional revenue sources can increase the dependability and sustainability of revenue flow from forest to community stakeholders.

Green Bonds

Conservation Target

Provide access to low cost capital for projects involving land protection through governments, institutions, or large corporations.

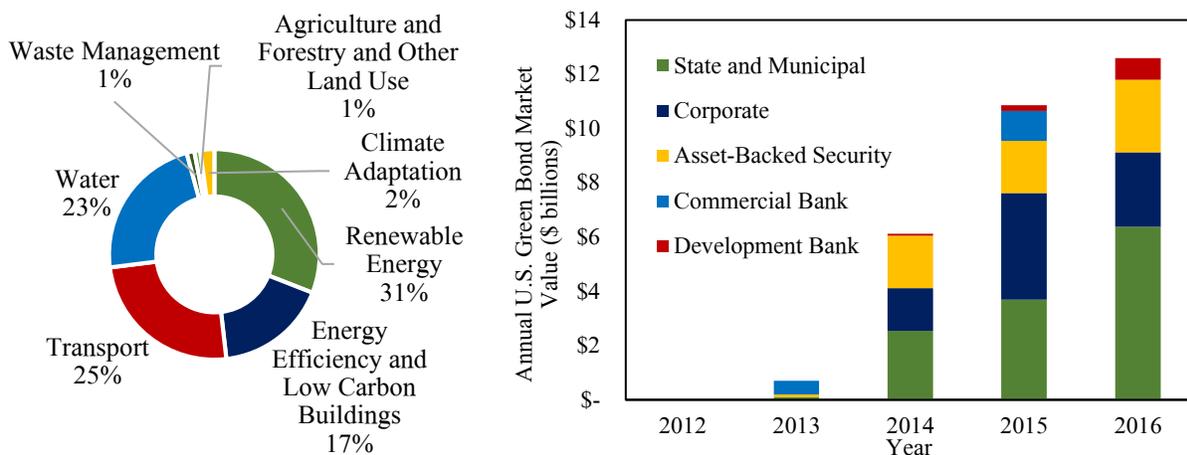
Mechanism

The issuance of green bonds to finance projects involving land conservation such as water management, sustainable land use, green infrastructure, climate change mitigation, and ecotourism.

Strategy Overview

A green bond is a debt instrument issued to raise capital for environmental projects (World Bank, 2015). Green bonds can be issued by companies, supranational institutions (such as multilateral banks), and public entities (municipal, state, or federal) in order to raise debt capital (World Bank, 2015). This section will emphasize green bonds for land protection purposes; however, the vast majority of green bonds issued to date have been used for environmental projects that do not directly conserve land (Figure 3.1). Overall, the U.S. green bond market has grown domestically from about \$700 million in 2013 to over \$12.6 billion (Figure 3.2). In 2016, the majority of U.S. green bonds were issued by state and municipal governments, which totaled \$6.4 billion.

U.S. Green Bonds - Project Distribution for 2016 and Market Value from 2012-2016



Figures 3.1 and 3.2 – U.S. green bond project distribution and U.S. market value for green bonds, adapted from Climate Bonds Initiative 2016.

Green bonds are similar to traditional bonds, but the proceeds from green bonds must be dedicated specifically to finance projects with environmental benefits (Table 3.3). General obligation green bonds repay bondholders through the general fund of the issuing entity while project-backed bonds repay bondholders through project revenues (Coalition for Green Capital, 2016). General obligation green bonds have successfully funded land protection but project-backed green bonds are a growth area, which has been deemed too risky to fund land protection projects so far due to insufficient project cash flows. General obligation green bonds take advantage of the strong credit rating of the issuing organization to provide a lower cost of capital and attract investors accustomed to state or municipal bond issuances.

Green bonds can be especially useful for increasing demand for a bond issuance from a larger audience beyond traditional bond investors, particularly those with impact goals. Green bonds also help increase public awareness of the issuer’s environmental stewardship. Concerns exists that some green bonds may not truly provide environmental benefits but instead use their “green” label as a form of greenwashing, which calls for greater scrutiny in the use of green bonds proceeds. As green bonds continue to increase in scale and their impacts become more closely monitored, the environmental uplift from green bonds will become more effective. Also as governments and businesses assume greater responsibility in fighting climate change, green bonds will likely play a significant role for these entities to finance green projects including those that involve land protection. Supranational institutions and big banks have already issued billions of dollars in green bonds to a great degree of success with high demand (World Bank, 2015). In the future, green bonds may attract additional private capital from a larger audience of investors for conservation in New England to improve environmental outcomes in the region.

Green Bond Protect Categories

<p>Categories with potential direct land conservation impacts:</p>	<p>Renewable Energy (woody biomass), pollution prevention and control (carbon sequestration), sustainable management of living natural resources, terrestrial and aquatic biodiversity conservation, sustainable water management, and climate change adaptation</p>
<p>Categories without direct land conservation impacts:</p>	<p>Energy efficiency, clean transportation, eco-efficient products, production technologies and processes</p>

Table 3.3 – Green bond project categories, adapted from International Capital Market Association 2016.

Currently, the number of green bonds that have funded land conservation projects is limited with the vast amount of projects being devoted to renewable energy, energy efficiency, and water quality improvements through gray infrastructure (World Bank, 2015). While a number of municipal entities have since followed suit, Massachusetts was the first state or municipality in the United States to issue bonds labeled as green bonds in 2013. Green bonds issued by Massachusetts or municipalities are attractive to investors because bonds are a familiar investment vehicle, they can be tax-exempt, and they can fund place-based projects. To-date, Massachusetts has issued three series of general obligation green bonds, which will be repaid through general tax revenues and have all used a portion of their proceeds for land protection projects (Massachusetts Treasury, 2013).

Although general obligation green bonds have successfully funded land protection projects, the development of project-backed green bonds, which would use project revenues such as the provision of clean water or timber from protected forests to repay the bondholder, would make green bond projects for land protection significantly more replicable and scalable as investable securities. Since forest carbon, drinking water, and stormwater management are becoming increasingly monetized across geographies, this may eventually allow for increased opportunities to create compelling green bond projects that can repay investors through the benefits provided by land protection. Also as the value of land conservation for water quality improvement becomes clearer to issuing entities, land conservation projects may substitute gray infrastructure projects funded by green bonds for water quality improvement. For example, D.C. Water and Sewer Authority issued the world's first environment impact bonds in 2016, which includes performance based returns to investors contingent upon combined sewer overflow reductions achieved through green infrastructure (D.C. Water and Sewer Authority, 2016).

Another reason that green bonds have attracted criticism is that the proceeds of green bonds may go towards projects that would have been completed anyway through traditional bond issuances. The green label however has enabled issuers to gain easier access to debt-capital by increasing the demand of these bonds through a broader and more diverse group of investors. With the continued dramatic growth in the green bond market, domestically and worldwide, a small portion of the proceeds will likely go towards land protection projects. Through improving the regulatory environment and market conditions to facilitate the payment of ecosystem services, the percentage of green bond projects involving land protection may notably increase and provide more funding for conservation, especially in the context of climate change.

Green Bonds Case Study
2013, 2014, and 2016 Green Bond Offerings
Commonwealth of Massachusetts Treasury

Case Study Key Facts

Bond Issuer	Commonwealth of Massachusetts Treasury
Number of Bond Offerings	Three (2013,2014, and 2016)
Total green bonds sold	\$700 million
Total allocated to the category of land acquisition and open space protection	\$83 million*
Total land protected	14,000 acres*

Date Issued	Green Bond Issuance Amount	Bond Type	Proceeds for land protection	Acres protected
June 2013	\$100 million	General Obligation - Tax exempt	\$12.6 million	2,000 acres
September 2014	\$350 million	General Obligation - Tax exempt	\$40.1 million*	7,000 acres*
July 2016	\$250 million	General Obligation - Taxable	\$29.3 million*	5,000 acres*

Table 3.4 – Breakdown of the three Massachusetts green bond offerings as they relate to land protection.

*11.7% or \$12.6 million of the proceeds from the 2013 green bonds were dedicated to projects specifically involving land protection based on the final investor impact report released by the Massachusetts Treasury for the 2013 green bonds.

Based on discussions with officials from the Commonwealth of Massachusetts Treasury we estimated that proceeds for land protection will remain relatively constant across these three

bond offerings. The 2013 bond proceeds protected over 2,000 acres of land, which was included in this same final investor impact report for the 2013 green bonds. We estimated proceeds for land protection as 11.7% of the total proceeds across all three bond offerings, yielding approximately 14,000 new protected acres.

Project Significance

The \$100 million in green bonds sold by Massachusetts in 2013 were the first green bonds by any state or local government in the United States. That issuance has since been followed by two additional issuances, totaling \$700 million. These bond offerings mark a transition from the viability of green bonds in the United States as securities backed by supranational financial institutions and big banks to much smaller scale governments and institutions, which may more directly impact the pace and scale of conservation in New England.

Project Summary

Similar to traditional general obligation bonds issued by the Commonwealth of Massachusetts, the first \$100 million of green bonds issued in 2013 were sold to investors as tax-exempt securities backed by the full faith and credit of the state. Since these bonds have both tax exemption and an added dimension of environmental impact they are especially appealing for impact investors. This bond issuance asserts that green bonds do not need to sacrifice competitive financial returns to provide positive environmental impact. Also there was no additional legislation required for the sale of green bonds in the state aside from standard bond authorization. Tax exempt securities issued by municipal or state governments are particularly appealing to investors as they may represent lower risk investments and have a higher likelihood of repayment, qualified by the strong credit rating of the issuing entity.

Because of high demand from investors for this bond issuance in Massachusetts, further issuances of green bonds in New England seem promising. Since these bonds were issued under difficult market conditions and as a part of a larger transaction that also included non-green series of bonds, the total issuance was downsized. However, the \$100 million series in green bonds received \$130 million in orders, an oversubscription of 30% (Massachusetts Treasury, 2013). Through this issuance the state received a wide range of investors including 154 different retail orders, 10 unique institutional investors, as well as 7 new institutional and professional retail investors (Massachusetts Treasury, 2013). Investors are repaid through the state's general fund and then bond proceeds reimburse this capital deficit from the general fund.

Within this green bond issuance, state projects have been funded in the following categories: clean and drinking water, land acquisition and open space protection, river

revitalization and habitat restoration, and energy efficiency and conservation. Land protection projects can reasonably fall under each of these categories except for the energy efficiency and conservation category. The green bond issuance from 2013 ultimately aided in the protection of 2,000 acres of land for conservation purposes and also restored and revitalized many other habitats (Massachusetts Treasury, 2015). Projects directly involving land protection from the 2013 green bonds only fell under the land acquisition and open space protection category and totaled \$12.6 million, which equated to 11.7% of the total issuance (Figure 3.5).

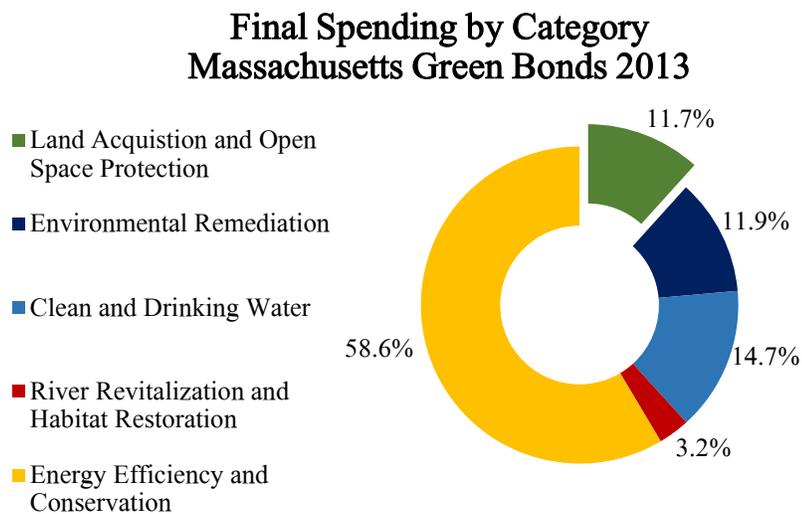


Figure 3.5 – Final spending of bond proceeds by category, adapted from Commonwealth of Massachusetts Treasury January 2015.

Proceeds from the bond issuance contributed to the overall costs of \$1.1 million to protect 70 acres of the Great Marsh in Massachusetts. Green bond proceeds contributed \$750,000 towards the purchase while the remaining \$350,000 came from various public and private sources. After the success of this first bond issuance there were two subsequent green bond offerings in the state of \$350 million and \$250 million in 2014 and 2016, respectively. The Commonwealth of Massachusetts intends to keep issuing green bonds on an annual or biannual basis, based on need. Future green bonds will likely also allocate proceeds to the 2013 green bond offering for land protection projects, with final proportions determined by the prevailing need.

Green bonds will be an important finance strategy to take action against climate change as they are likely to provide easier access to debt capital at larger scales as the green bond market

matures. Green bonds issued by state and municipal governments have the potential to meet the growing investor demand for low-risk, fixed-income investments linked to green infrastructure projects in New England. The green bond label in Massachusetts so far has not decreased the cost of capital, but it has increased demand and attracted a more diverse group of investors. However, the rapid growth and demand of green bonds indicates there are several opportunities to develop this strategy further to increase its impact on funding land protection projects.

By improving the regulatory environment and market conditions to facilitate payments for ecosystem services, there may be an opportunity to increase the number of projects financed through green bonds that involve land protection as opposed to gray infrastructure especially with regard to water quality and management projects. Also, the advancement of project-backed green bonds involving land protection may be able to further scale up funding for land conservation beyond general obligation green bonds. Since bonds are familiar to many investors, green bonds may attract funding for land protection from those who wouldn't normally invest in conservation projects. Although these bonds more effectively facilitated access to debt capital for the state, they have not yet attracted new funding for conservation for Massachusetts. The projects funded through these green bonds would have otherwise been funded through traditional state bonds. However, the high demand that Massachusetts's experienced from investors for the green bonds issued in 2013 provided motivation for two subsequent issuances in 2014 and 2016. With the high demand for these three issuances, Massachusetts now intends to issue green bonds on an annual or biannual basis, which may generate additional funding for land protection in the region.

Increasing Funding for Land Conservation through Green Bonds

Major success factors

- Bonds backed by the full faith and credit of the Commonwealth of Massachusetts makes these bonds appealing to risk averse investors.
- Bonds closely imitated the World Bank's Green Bond issuance that has already successfully funded green projects.
- Because these bonds funded environmental projects, they received high demand through a larger and more diverse pool of investors than bonds for traditional capital projects issued by the Commonwealth of Massachusetts.
- The tax exempt aspect of the 2013 and 2014 green bonds provided an additional level of appeal making them even more competitive in the bond market for investors.

- All three green bond issuances in Massachusetts experienced an oversubscription due to their green label as a means to deploy capital.

Opportunities for scalability and replicability

- Improving the regulatory environment and market dynamics surrounding payment for ecosystem services will allow for project-backed green bonds to scale up.
- As green bond markets mature, the continued oversubscription may improve pricing for borrowers, which would decrease returns for investors.
- The benefits of land protection need to be better conveyed to the general public and governments to advance the priority of land protection in future green bond offerings.
- Water companies and authorities may be able to issue green bonds to buy lands for water resource protection and improvement of water quality to their customers. The bond can then be repaid through the customer's water payments and avoided costs to improve water supplies and quality through gray infrastructure projects.
- Land could be purchased through green bond proceeds and bondholders could be repaid through recreation fees, sustainable harvest revenues, carbon offset revenues, water quality improvements, and other ecosystem services if bundled correctly.
- Increased demand from investors for legitimate green projects will help to drive the use of municipal green bonds, which include land protection to become commonplace across New England.
- Green bonds will be best suited for municipalities, state governments, and companies with strong credit and revenue sources.
- Philanthropies could backstop green bonds to de-risk them for investors, especially pilot project-backed green bonds involving land conservation.

Real Estate Taxes

Conservation Target

To protect land for the purposes of maintaining the public benefits it provides to a state or municipality.

Mechanism

The implementation of a real estate tax for conservation through real estate transfer taxes or property tax surcharges.

Strategy Summary of Real Estate Taxes

In Massachusetts, real estate transfer taxes (RETTs) and real estate property tax surcharges are two types of closely related real estate taxes implemented for land conservation purposes, which have potential for further implementation in New England. Due to the close relationship of these two types of taxes in Massachusetts they deserve examination together as a conservation finance strategy that can increase public funding for conservation. In the 1980s, RETTs were first implemented as a 2% transfer fee in Nantucket and Martha's Vineyard to protect the natural resources and natural heritage of these islands. With RETT policies, revenues are managed by land banks in their respective municipalities. Land banks provide a compensatory conservation finance model, in which a real estate transfer tax is levied on landowners and developers at the time of sale of properties to purchase other lands to remain permanently undeveloped. The revenues generated by land banks closely follow the behavior of the real estate market. Land banks have been implemented in areas of extremely high land value, where other sources of conservation finance may not stretch very far. This quid pro quo mechanism ties the rate of protection fractionally, but directly, to the rate of development.

There are currently four land banks located in New England created through the implementation of RETT policies. Most land banks around the country operate in seasonal resort communities similar to Nantucket and Cape Cod (Figure 4.2). Since there are many affluent coastal and island communities in New England, there may be opportunity to further replicate this policy in those areas. Although RETT policies have been in existence since the 1980's, the potential for increased implementation across the region is worth further examination.

Name	Location	Cumulative Acres Acquired in Fee or Easement through Transfer Fees	Cumulative Transfer Fee Revenue	Date Created
Nantucket Island Land Bank	Nantucket, MA	3,479	\$282 million	1983
Martha's Vineyard Land Bank Commission	Edgartown, MA	3,355	\$203 million	1986
Block Island Land Trust	Block Island, RI	536	\$30 million	1986
Little Compton Agricultural Conservancy Trust	Little Compton, RI	1,322	\$18 million	1985

Table 4.1 – Table of Organizations in New England that Manage Real Estate Transfer Taxes for Conservation.

An attempt to create a RETT policy at the state level in Massachusetts, as a result of its success at the municipal level, failed to pass in the legislature, especially due to resistance from real estate associations. In 2000, however, a real estate property surcharge policy for conservation successfully passed through the state legislature called the Community Preservation Act (CPA), which stemmed from these initial discussions to pass a state level RETT policy for conservation. The primary reason the CPA was approved in the state legislature was that it broadly taxed all real estate owners in participating communities and did not exclusively tax those buying real estate, as RETTs do. The passage of the CPA then allowed municipalities to vote on the implementation of a real estate property tax or surcharge, of no more than 3%, where the proceeds would be used for protecting the natural and cultural heritage for that municipality as well as to create more affordable housing and advance historic preservation. The CPA also collects recording fees for real estate transactions, which then go to the Community Preservation Trust Fund to provide matching grants to municipalities as an incentive to adopt the policy. Connecticut and New Hampshire have subsequently adopted state level recording fees for real estate transactions to provide grants for similar purposes to the CPA including open space protection through the Community Investment Act and the Land and Community Heritage Investment program respectively. Although these recording fee policies generate substantially

less revenue than the CPA, they also have potential for further implementation in New England to generate more funding for land protection.

In Massachusetts, the Community Preservation Act generates a dependable source of public funding for land conservation, but the other New England states have yet to adopt similar policies. The potential for state-level real estate property surcharge policies such as the CPA to be implemented across the region, warrants further examination as a conservation finance strategy. If applied with the same level of municipal adoption that Massachusetts had in 2015 (46% of municipalities), this would generate an estimated \$77 million dollars per year for open space protection for New England (Table 4.3). Although each state poses its own unique set of challenges for implementing a CPA-like policy and the adoption rate would likely vary widely across municipalities in each state, this estimate provides an understanding of how CPA-like policies, if implemented with the same level of success, could have dramatic impacts for generating new funding for conservation in New England. Annual revenues from this policy would likely continue to increase with inflation and as municipalities continued to adopt the policy. The estimated annual revenues for open space protection across all states are relative to the ratio of total CPA revenues allocated to open space protection in Massachusetts from 2000-2016 (29%).

State	Total estimated annual CPA revenues	Estimated annual revenues for open space protection
Connecticut	\$62 million	\$18 million
Maine	\$15 million	\$4 million
Massachusetts	\$142 million	\$41 million
New Hampshire	\$20 million	\$6 million
Rhode Island	\$16 million	\$5 million
Vermont	\$9 million	\$2 million
Total	\$264 million	\$77 million

Table 4.2 – Estimated annual revenues for open space protection generated from implementing the CPA policy across all states of New England. We estimated these values using Federal Census Bureau data on population (2015) and median value of owner-occupied housing units (2010-2014), municipal population census estimates from the University of Massachusetts Donahue Institute (2014), and CPA revenue data provided by the Community Preservation Coalition in the Commonwealth of Massachusetts 2016.

Real Estate Taxes for Conservation Case Study #1

Community Preservation Act (CPA), Commonwealth of Massachusetts

Case Study Key Facts

Tax type	Property tax surcharge
Approved open space projects	1,613 projects
Total acres conserved	23,471 acres
Annual revenue in FY 2015	\$142 million
Total amount raised FY 2002-2015	\$1.5 billion
Total allocated for open space protection projects	\$460 million (29% of total revenues)
Date policy initiated	September 14, 2000
Tax surcharge	Determined by community but not exceeding 3% of annual property taxes
Participating municipalities	172 municipalities or 49% of Massachusetts municipalities (November, 2016).

Case Study Significance

The Community Preservation Act is the first modern statewide tax policy in New England implemented for land conservation. Given its success in Massachusetts, this policy warrants consideration for implementation by the other New England states.

Case Study Summary

The Community Preservation Act (CPA) is a state policy, which municipalities can elect to participate in through a ballot referendum to advance conservation in their community via property tax surcharges of up to 3 percent. This policy enables communities to “preserve open space and historic sites, create affordable housing, and develop outdoor recreational facilities”

(Community Preservation Coalition, 2016). As a result, the CPA benefits state and local economies by expanding housing opportunities, construction jobs, tourism, and the provision of ecosystem services (Conservation Capital in the Americas, 2008). Since the CPA’s passage by the Commonwealth of Massachusetts in 2000, 234 municipalities have voted to adopt the CPA with a 73 percent adoption success rate. By 2016, 172 municipalities, or 49% of all Massachusetts municipalities, have adopted the CPA, which has generated over \$460 million for open space protection (Figure 4.2).

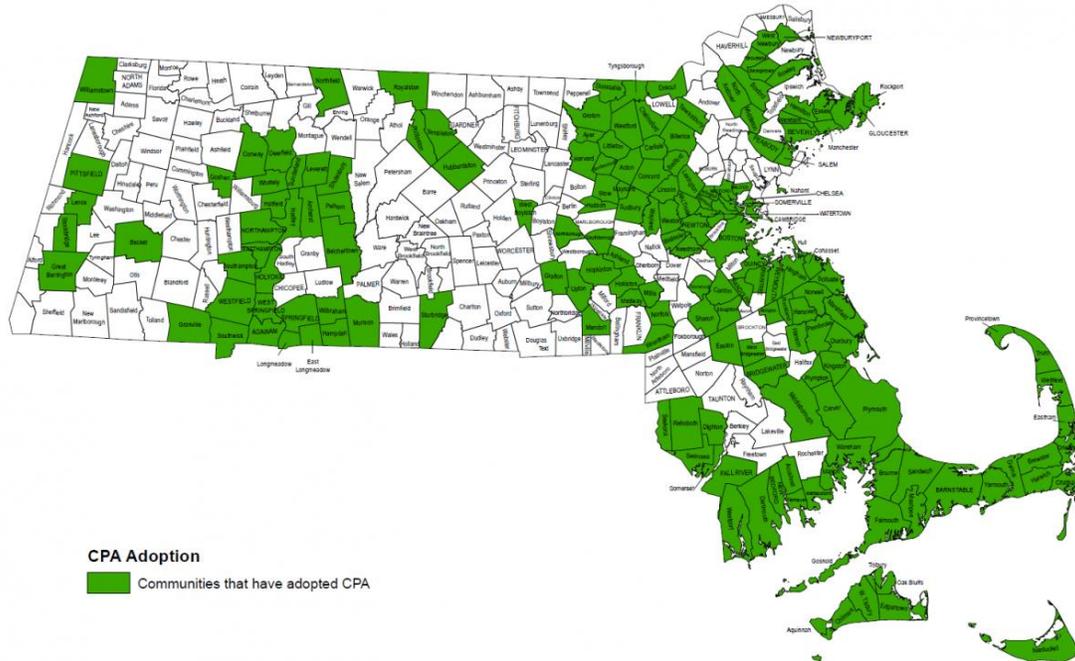


Figure 4.3 – Map of CPA communities and communities looking to adopt CPA. Community Preservation Coalition November 2016.

Leading up to the passage of the CPA, a state-level RETT policy stemming from the Nantucket Islands Land Bank had been rejected for 15 years by the state legislature as well as by the voters on Cape Cod in 1998. In 1999, the Massachusetts House and Senate voted on the passage of the CPA without success because the senate’s version of the CPA included an option for towns to implement a RETT or a property tax surcharge. After nearly a year in the state legislature, the transfer tax option was dropped and the CPA was ultimately approved in 2000 (Massachusetts Executive Office of Energy and Environmental Affairs, 2009). This staunch opposition to RETTs at the state level serves as a testament that RETTs may not be viable as a statewide conservation tool throughout New England but suggests that property tax surcharges may be easier to adopt at the state level.

The CPA has several optional exemptions listed below to mitigate the effects of the surcharge on certain taxpayers (Community Preservation Coalition, 2016):

- 1) The CPA property tax surcharge may not be levied on the first \$100,000 of taxable value of residential real estate or commercial property value.
- 2) Property owned and occupied by a person who would qualify for low-income housing or low- or moderate-income senior housing in the city or town.
- 3) Commercial and industrial properties in cities or towns with classified tax rates.

The CPA policy also included the creation of a dedicated state matching fund for the program called the Massachusetts Community Preservation Trust Fund. This fund generates revenues from a \$20 surcharge on Registry of Deeds filings, which are primarily recordings of deeds and mortgages and discharges of mortgages. A \$10 surcharge on the filing of municipal lien certificates is also levied. As a trust fund, appropriation cannot occur as part of the normal state budget process. Therefore, the Community Preservation Trust Fund cannot be used for other purposes unless the state legislature votes to change the law. The CPA generated \$142 million in revenue in FY 2015 and an average of \$107 million in annual revenue from 2002-2015 (Figure 4.3). Since its creation the CPA has protected over 23,000 acres.

CPA Revenues Generated from Property Tax Surcharge and State Matching Grant Program

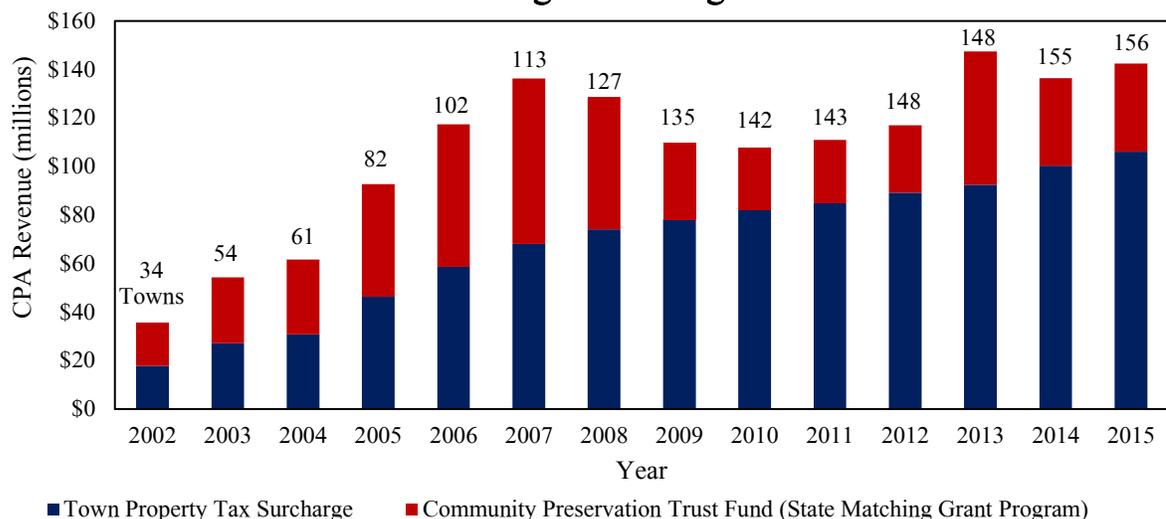


Figure 4.4 – Proceeds Generated from the Town Property Tax Surcharge Compared with the Community Preservation Trust Fund Matching Grant Program, Created from data provided by the Community Preservation Coalition 2016.

Depending on the balance in the trust fund, matching funds have ranged from 5 to 100 % of local CPA property tax surcharge revenues. During its first six years, the balance in the fund was sufficient to provide 100 percent matching funds to all communities that had adopted CPA. The prospect of communities receiving dollar-for-dollar matching funds from the state encouraged many communities to adopt CPA. Therefore, this matching grant fund has been exceptionally effective in the role of leveraging state dollars to attract more municipal dollars for conservation purposes. However, several factors contribute to fluctuations in the availability of funds through this matching grant program: changes in the real estate market affect annual trust fund revenues, the state legislature may change how that revenue is calculated or if additional funding is provided for in the state budget, and the rate of adoption among communities across the state is different each year. The Community Preservation Act provides an example of how the remaining states of New England might implement a real estate property surcharge for conservation that could generate more public funding for conservation.

Increasing Funding for Land Conservation through Real Estate Property Surcharge Policies

Major Success Factors

- Provides relatively steady and predictable revenue from the state trust fund and local property tax surcharges.
- Town participation is voluntary.
- Broadly taxes all property owners in that municipality instead of taxing an exclusive subgroup.
- Incentive to join through eligibility for state matching grants.
- The Community Preservation Coalition has been instrumental to the success of the CPA by supporting its passage through the state legislature, assisting municipalities in understanding and adopting the CPA, and also in further advocating for the CPA at the state level.

Opportunities for scalability and replicability

- Has potential for implementation in all other states of New England.
- Could become a primary steady source for public funding in New England if implemented across all states that would either complement or replace existing programs.
- This policy has been proven to work effectively across a diversity of community types both economically and geographically.

Real Estate Taxes for Conservation Case Study #2

Nantucket Islands Land Bank, Massachusetts

Case Study Quick Facts

Tax type	Real Estate Transfer Tax
Total acres conserved	3,479 total acres 2,976 fee owned acres 503 acres with conservation restrictions
Annual revenue in FY 2015	\$19.26 million
Acres acquired in FY 2015	33.24 acres
Total dollars spent on land purchases since 1983	\$262.98 million
Date policy initiated	1983
Transfer fee	2% of real estate transaction

Case Study Significance

The Nantucket Islands Land Bank provides an example of a successfully implemented real estate transfer tax (RETT) policy in New England. This RETT policy has been effective in attracting funding for conservation to this seasonal resort community where other conservation finance strategies may not work as effectively due to the high market value of land on Nantucket.

Case Study Summary

The Nantucket Islands Land Bank has successfully generated public funding for conservation at the municipal level for 33 years. To date, nearly 50% of Nantucket is permanently protected open space with the land bank playing a significant role alongside several other conservation organizations. This policy has been able to protect the full range of habitats existing on the island such as beaches, wetlands, aquifer recharge areas, moorlands, heathlands, rare species habitat, ocean, pond and harbor frontage, and properties for passive and active recreation. Since the creation of this policy, the land bank has generated \$282 million with a total of 3,479 acres or about 9% of the island's total land area conserved (Figure 4.4).

Land banks provide a means to directly mitigate development pressure by generating tax revenues for land protection. Since a RETT policy at the state level was rejected in the

legislature, land banks will most likely have greater success of attracting funding for conservation at the town level in areas with high property value and where communities have a strong sense of preserving the natural and cultural heritage of their community.

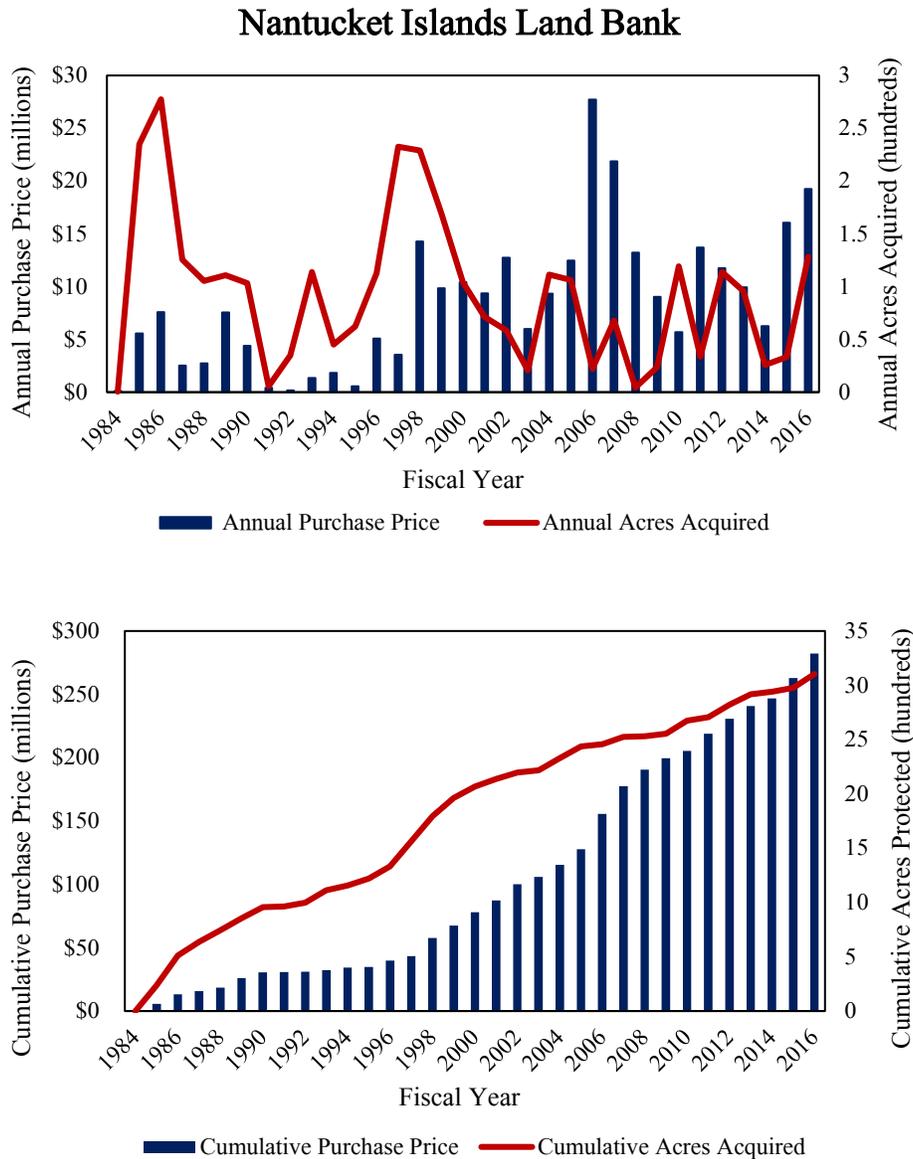


Figure 4.5 – Purchase Prices and Acres Acquired by Nantucket Islands Land Bank, data provided by Nantucket Islands Land Bank 2016.

Increasing Funding for Land Conservation through Real Estate Transfer Tax Policies

Major Success Factors

- Implemented in a community with a high rate of real estate transfer and high property value.
- Implemented in a community where historic and natural preservation is a priority.

Opportunities for scalability and replicability

- Improve the translation of environmental impacts of an activity into an amount for taxation.
- Revenues are linked to the housing market; therefore in areas where the housing market is especially stagnant this policy may not be effective.
- This policy may be most effective in affluent small communities that have limited room to grow.
- Information sharing to candidate communities by local conservation organizations.
- Significant public support must be garnered to pass new land bank policies, which can be challenging with well-funded and organized opposition.

Sales Taxes

Conservation Target

To create a stable stream of public funding for land protection at the state level.

Mechanism

The implementation of a sales tax increase for conservation that would provide a stable and significant stream of public funding through a small increase in state sales tax.

Strategy Overview of Sales Taxes for Conservation

This section focuses on state sales taxes that provide additional revenues devoted to land protection and related conservation programs. Sales taxes levied on goods and services for the purpose of funding conservation are not new. In 1937, the passage of the Pittman-Robertson Act, still in effect today, created a national sales tax for land conservation on the purchase of long guns, ammunition, handguns and archery equipment. The revenues from this sales tax get distributed by the U.S. Fish and Wildlife Service to state wildlife agencies based on land area and number of hunting permits issued. Sales taxes that broadly tax all goods and services have been successfully implemented at the state level in Missouri, Arkansas, and most recently Minnesota. These policies have shown that a very small increase in a state's sales tax rate could produce very large revenues for state-level conservation programs. While sales tax policies for conservation have been successfully implemented in these three states they have not been widely adopted across the United States. The sales tax policies for land conservation in these states include rate increases from 0.125% to .375%, and yield \$115, \$66, and \$317 million per year for Missouri, Arkansas and Minnesota, respectively (Table 5.1).

These sales tax rate increases, which have generated substantial new public funding for land protection with only modest relative rate increases, may provide an appealing strategy to increase finance for conservation in New England states. Importantly, the three existing programs did not substitute for other state conservation funding, but provided additional dedicated conservation funds. In the case of Missouri and Arkansas, revenues from these sales tax increases go to the state wildlife management agency or natural resources department for conservation purposes. In Minnesota, entities such as state agencies, non-profits, and local governments can apply and compete for funds generated through this sales tax increase for conservation. Given their potential for generating new conservation finance, the feasibility of adopting modest increases in sales taxes in some New England states should be explored further. One major advantage of this approach to conservation funding would be a steady, predictable

flow of revenue to land protection that helps correct the current instability in state funding shown in several New England states (Figure 5.2). Furthermore, as is typical of state conservation funding, sales tax-based conservation programs would leverage significant new private funding for land protection through matching requirements. While we have focused on the portion of these sales tax programs in Missouri, Arkansas, and Minnesota that are devoted to conservation programs, it is important to note that portions of these taxes are also devoted to other state priorities, such as arts and cultural programs.

State sales tax policies for land conservation	State	Sales tax rate increase	Year initiated	Acres protected through sales tax revenues	Estimated annual revenue
Design for Conservation	Missouri	0.125%	1976	312,000	\$115 million
Amendment 75	Arkansas	0.125%	1996	20,000	\$66 million
Clean Water, Land, and Legacy Amendment	Minnesota	0.375%	2009	269,000	\$317 million

Table 5.1 – Table of known state-level sales tax policies that generate funding for land protection in the United States.

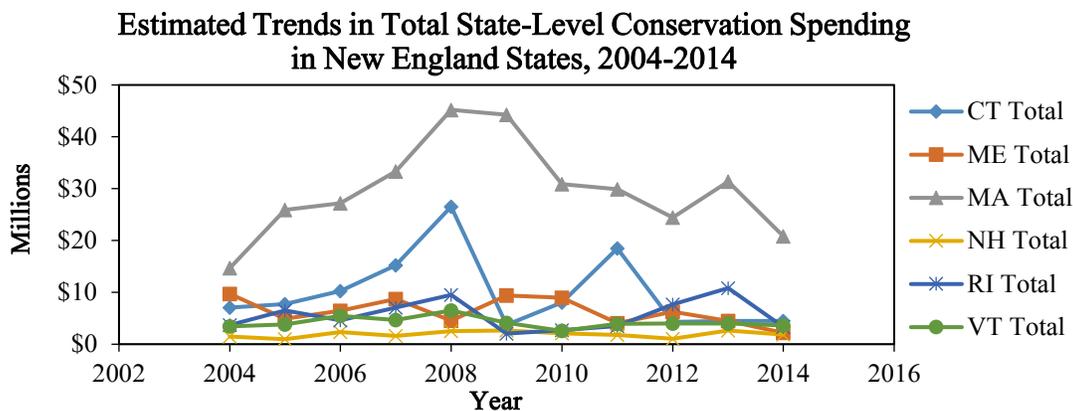


Figure 5.2 – Estimated Trends in Total State-Level Conservation Spending in New England States, 2004-2014. Highstead 2016.

Sales Tax for Conservation Case Study

Clean Water, Land and Legacy Amendment, State of Minnesota

Case Study Key Facts

Policy type	Sales tax increase amendment
Sales tax rate increase	0.375% (3/8ths of 1%)
Projected revenue	\$11 billion over 25 years (\$300 million per year)
Longevity of policy	2009-2034
Date of implementation	1 July 2009
Approval process	Statewide ballot referendum; Passed with 59% in favor of the tax rate increase

Significance

This case study discusses the most recently implemented sales tax for conservation at the state level in the United States. While gathering public support to impose a state level tax for conservation is a difficult task, this policy provides a dependable stream of public funding for conservation that incurs a small cost to the average taxpayer but generates substantial revenue for land protection in Minnesota.

Summary

This Minnesota sales tax increase, the Clean Water, Land, and Legacy Amendment, was approved as a constitutional amendment for the state government of Minnesota in 2008. Currently, this amendment will be in effect from 2009 to 2034. The approval of this amendment resulted in a 0.375% sales tax rate increase to protect the natural and cultural heritage of the state. While this was the highest sales tax rate increase for conservation that any state has yet to implement, the state department of revenue estimates that this tax increase will only equate to approximately \$60 in added annual tax burden per household. This tax generates approximately \$317 million in revenue per year, which is steadily increasing with inflation, for natural resource and cultural heritage protection, and has already generated over a billion dollars in revenue since

it took effect in 2009 (Figure 5.3). About \$215 million of the revenue generated from this sales tax have been spent on conservation projects in Minnesota so far.

Clean Water Land and Legacy Amendment Allocations of Sales Tax Revenues

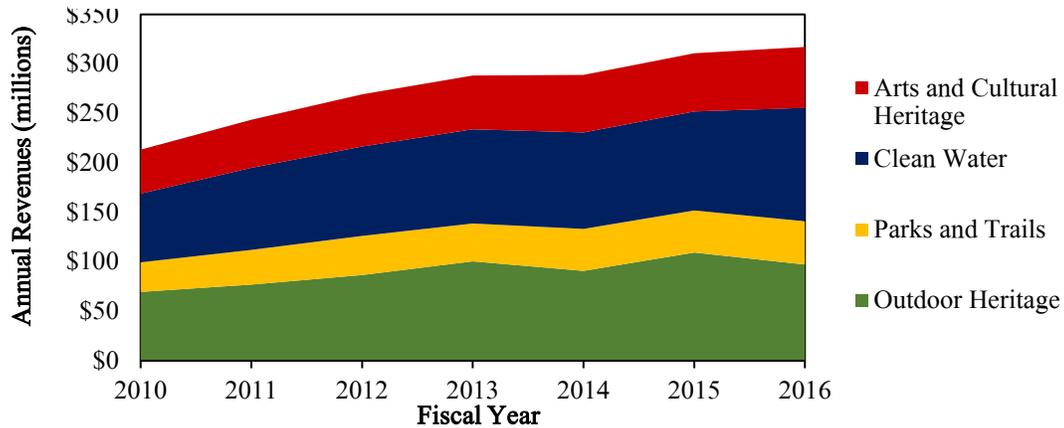


Figure 5.3 – Clean Water Land and Legacy Amendment Sales Tax Revenues and spending allocations. Minnesota Department of Natural Resources 2016.

This tax increase provides funding to protect, enhance, and restore water resources and ecosystems in the state. However, a portion of the funds also contribute to art and culture heritage initiatives and developing park facilities and trails in the state. As a result, the revenues generated from the sales tax are allocated into four funds of varying percentages depicted below (Figure 5.4). The Outdoor Heritage Fund provides funding directly for the purposes of land protection while the other funds can sometimes fund projects involving land protection. For example, the Parks and Trails Fund can purchase and protect land for the purposes of creating a new trail corridor.

Allocation of Tax Revenues to State Funds from Minnesota Conservation Sales Tax

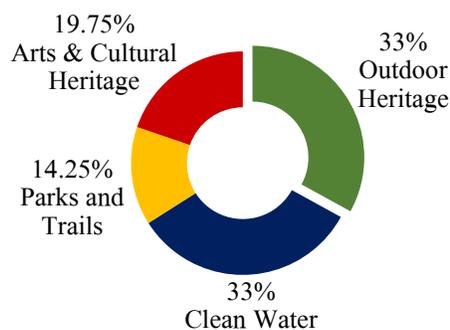


Figure 5.4 – Allocation of sales tax revenues through the Legacy Amendment. Minnesota Legislative Coordinating Commission 2016.

So far this sales tax increase has led to the protection of 268,642 acres in the state of Minnesota, which includes 42,316 acres acquired in fee and 226,326 acres protected through conservation easements. It is projected that with the funds raised over the current 25-year policy period of this tax, the amount of land protected will be approximately 700,000 acres. It is estimated that 267,000 – 276,000 of these acres will be owned in fee, and 427,000 – 442,000 of these acres will be protected under conservation easement. Separate from this sales tax, Minnesota uses 40% of its proceeds from the state lottery ticket sales towards land conservation which has totaled over \$500 million since 1991. Adopting a similar tax policy in one or more New England states could lead to a more stable and substantial funding stream to support state conservation programs, particularly if such policies were not substitutes for existing state funding programs. Also, the establishment of a public funding source of this nature is very difficult to divert towards other state spending while many currently existing state programs are more vulnerable to appropriation to address budget deficits.

We conducted the following analysis to estimate the new revenue a Minnesota-like tax policy would generate in New England states. We used a conservative 0.125% sales tax rate increase, which is one third of the sales tax rate increase in Minnesota (0.375%). Using these assumptions, we estimate sales tax increases could generate \$240 million annually for conservation to New England (Figure 5.5). Since New Hampshire has no sales tax, we omitted it from the projection.

From 2004 – 2014 the average annual state spending for conservation was \$4.27 per capita based on data acquired from Highstead’s report on Public Funding for Conservation in New England (Highstead, 2016). The average increase in annual state level funding due to a 0.125% sales tax rate increase is estimated to cost \$17.88 per capita based on 2014 state sales tax revenue data and 2015 federal census data (See Figure 5.6). Therefore, this increase would more than quadruple the average annual state-level funding spent for conservation from 2004-2014 in New England. This would also almost triple the average annual combined state and federal spending for conservation from 2004 – 2014 in New England, which equated to \$6.12 per-capita (Highstead, 2016).

From another perspective, it is estimated this increase would result in a \$46.84 annual average increase for the household tax burden (Figure 5.6). This increase in annual funding equates to about 25% of the funding received from federal and state programs over the 11-year period from 2004-2014, which totaled \$973 million (Highstead, 2016). Passing sales taxes for conservation through the state legislatures will likely be the most difficult challenge in implementing similar policies in New England. However, unified support from conservationists,

sportsmen, and arts and cultural organizations was critical to the success of sales taxes for conservation in other states, and should be considered part of the strategy for pursuing this conservation finance strategy in New England states.

State	Current State Sales Tax Rate	Assumed New State Sales Tax Rate	% Increase in Sales Tax Rate	2014 Annual Revenues from existing General Sales and Gross Receipts Taxes	Estimated Additional Annual Sales Tax Revenue for Land Conservation (0.125 % Sales Tax Rate Increase)
CT	6.35%	6.475%	2.0%	\$3.98 billion	\$78.4 million
ME	5.50%	5.625%	2.3%	\$1.19 billion	\$27.1 million
MA	6.25%	6.375%	2.0%	\$5.52 billion	\$110.4 million
RI	7.00%	7.125%	1.8%	\$0.92 billion	\$16.3 million
VT	6.00%	6.125%	2.1%	\$0.35 billion	\$7.4 million
Total	6.25%	6.375%	2.0%	\$11.96 billion	\$239.6 million

Table 5.5 – Projection of total new funding for land conservation with a .125% sales tax rate increase. State sales tax rate data from the Sales Tax Institute, 2016. General sales tax and gross receipt tax revenue data from U.S. Census Bureau 2015. (*Since New Hampshire has no sales tax it was omitted from the projections. Weighted average based on population data from the 2015 federal census).

State	Average Annual Federal and State Spending per Household for Conservation from 2004-2014	Average Annual State Spending per Household for Conservation from 2004-2014	Average Annual Cost per Household for .125% Sales Tax Rate Increase
CT	\$9.33	\$7.19	\$57.79
ME	\$27.81	\$11.16	\$48.97
MA	\$14.43	\$11.52	\$43.48
RI	\$17.18	\$13.11	\$39.91
VT	\$26.22	\$15.69	\$28.71
Weighted Total	\$15.18	\$10.63	\$46.84

Table 5.6 – Comparison of average annual per-capita funding from 2004-2014 to annual per household increase in funding from .125% state sales tax rate increase for conservation. Household data collected from the U.S. Census Bureau, 2015. Annual spending per household data from 2004-2014 for federal and state funding in New England adapted from Highstead 2016. (*Weighted total based on 2010 and 2015 U.S. population census data).

Increasing Funding for Land Conservation through Sales Tax Policies

Major success factors

- Including clean water, parks and trails, and historical preservation components into this conservation sales tax provided the extra support needed to pass this policy through the legislature.
- Provides a public conservation finance tool that can generate a dependable stream of substantial public funding for conservation across an entire state.
- This policy does not have a noticeable impact to the purchasing power of the average citizen (average cost of \$60 annually per household in Minnesota).
- These taxes are especially difficult to divert after being implemented and are additional to existing conservation funding sources in the state.

Challenges to scalability and replicability

- Difficult to pass a bill of this nature at the state level. New Hampshire lacks a sales tax and therefore would be even less likely to adopt a conservation sales tax policy.
- Difficult for citizens to accept being taxed more than they already are.
- Likely requires a grassroots movement to mobilize the public and legislature to take legislative action.
- Unlike a gas tax funding transportation infrastructure, land protection does not have a direct connection to the consumption of goods and services.

Corporate Sustainability

Conservation Target

Forest and watershed protection that helps businesses offset their environment impacts.

Mechanism

A partnership with a corporate sustainability initiative, which could help the company offset their environmental footprint, while achieving land protection and/or improvements in sustainable natural resource management.

Strategy Summary

Corporate responsibility is playing an increasingly integral role in how companies do business around the world. Through the 2014 New York Declaration on Forests, thirty of the world's largest companies made ambitious commitments to reduce forest loss through private sector activities (United Nations, 2014). As of 2015, 81% of S&P 500 companies integrated sustainability in their corporate reporting, up from 20% of the S&P 500 in 2011 (Governance and Accountability Institute, 2015). This shift in corporate strategy has increased the demand for opportunities that involve protecting or sustainably managing land to mitigate the negative impacts of their business on the environment and to reduce risk. Corporate sustainability programs involving land protection serve to bolster a company's reputation and in many cases strengthen their market share and earnings potential. For example, Unilever's sustainable living brands accounted for half their growth in 2015 (Unilever, 2016). While many of these programs are focused in developing countries that satisfy corporate supply chains, New England's forested landscape and water resources stand to gain from local and regional corporate sustainability.

As of 2011, 70% of New England's land area or 28 million acres was readily available for timber management and 80% or 32 million acres was forested (New England Forestry Foundation, 2014). Across New England, the annual production of wood from 2007-2011 was 8.15 million cords (New England Forestry Foundation, 2014). As a result of New England's substantial forest resources, businesses with corporate sustainability programs have already taken an interest in permanently protecting New England's forests to create sustainably managed working forests for their supply chain, to offset their building footprint, and to more broadly reduce environmental impacts. Since 2005, three companies with corporate sustainability initiatives have contributed funding for land conservation projects in New England, protecting over 357,000 acres, all of which were in Maine (Table 6.1).

Company	Primary Conservation Partner	Program Name	Project Name	Project Acres	Project Year	Project Type
Walmart	National Fish and Wildlife Federation	Acres for America	Sunrise Easement	312,000	2005	Sustainable Forestry
Apple	The Conservation Fund	Sustainable Fiber Initiative	Reed Forest	32,400	2015	Sustainable Forestry
TD Bank	The Nature Conservancy	TD Forests	Bradley-Sunkhaze Preserve	12,700	2015	Forest Conservation

Table 6.1 – Known corporate sustainability projects in New England involving land protection. All of these projects have been conducted in Maine.

While corporate partnerships for conservation are not new, the recent increase in focus on corporate sustainability could help accelerate regional conservation initiatives. Non-profit conservation organizations have played an integral role in New England to facilitate these initiatives, which suggests that these cross-sector partnerships will continue to act as a key component for attracting more funding for conservation through corporate sustainability programs. The transition to establishing sustainable paper supply chains for companies worldwide can have tremendous impacts in protecting New England’s forests as sustainably managed forests. Also, the push to offset a company's environmental footprint more broadly is a potentially compelling reason for companies to choose to protect forests in New England through their corporate sustainability programs. Since companies leading these initiatives are some of the most successful firms in the world, it is highly likely that other companies may adopt similar strategies going forward.

Corporate Sustainability Case Study #1

Apple Sustainable Fiber Production

Reed Forest, Maine

Case Study Quick Facts

Project type	Sustainable working forest
Project Partners	Apple The Conservation Fund Forest Society of Maine
Location	Reed Forest Aroostook County, Maine
Project Size	32,400 acres
Purchase date	2015

Project Significance

This sustainable forestry project is part of Apple’s commitment to have a net-zero impact with regard to the fiber produced for their product packaging. As more companies adopt similar sustainability programs around the world, the forests of New England, especially northern working forests, have the potential to attract significant amounts of private funding for conservation.

Projects Overview

Apple recently made a commitment in their 2015 Environmental Responsibility Report to having “a net-zero impact on the world’s supply of sustainable virgin fiber” for their product packaging (Apple, 2015). This initiative includes increasing recycled paper content, sourcing paper responsibly, and conserving enough acreage of working forests around the world, which produce volumes of fiber equivalent to its demand for virgin packaging fiber.

Through Apple’s commitment to creating and protecting sustainable working forests, a partnership emerged between Apple and The Conservation Fund to identify and protect working forests appropriate for conservation. This partnership helps to address the threats that working forests across the U.S. now face from development and land-use conversion. So far, Apple and The Conservation Fund have protected 36,000 acres across two sustainably managed forests in the eastern United States. These forests include the 32,400 acre Reed Forest in Maine and the

3,600 acre Brunswick forest in North Carolina. In fiscal year 2015, the combined annual paper fiber production from these two forests was “equivalent to about 30 percent of the virgin fiber” used in Apple’s product packaging (Apple, 2016).

The Reed Forest in Aroostook County, Maine was identified by The Conservation Fund as a viable project as it combined elements of economic and environmental sustainability of interest to both Apple and The Conservation Fund. Reed Forest connects with a larger conserved landscape of over 1 million acres that stretches across Canada and the United States. As a result of the partnership, The Conservation Fund now owns and manages Reed Forest to provide a steady supply of sustainably harvested timber to paper and pulp mills, which supports economic development in the region, prevents forest fragmentation, addresses climate change, and filters water for downstream communities.

The Conservation Fund purchased this forest in partnership with Apple in 2015 through The Conservation Fund’s Working Forest Fund® (WFF). The WFF pools investment and philanthropic capital to acquire vulnerable tracts with the purpose of permanently conserving forest under easement. The revenues of sustainably managed timber harvests can then help offset the holding costs of the property until an easement can be established to permanently protect the property. Once an easement is established, the Fund then sells the permanently protected property back into the timberland marketplace and can use these proceeds to repeat the process. In 2016, Apple and The Conservation Fund donated a conservation easement for Reed Forest to the Forest Society of Maine along with an endowment to monitor and enforce the easement in perpetuity.

In 2015, Apple also began conducting a five-year pilot project with the World Wildlife Fund to transition up to 1 million acres of forest in southern China into responsible management by 2020. A corporate sustainability project of this scale, if successfully implemented in New England, could have dramatic impacts for conservation in region. Apple and The Conservation Fund’s Reed Forest partnership in Maine may be the earliest stages of a movement for companies to permanently protect working forests to provide raw materials to supply chains while also maintaining their ecological benefits. Going forward, this strategy of permanently protecting sustainably managed forests has greatest appeal to large companies whose supply chains rely on forest products.

Corporate Responsibility Case Study #2

Walmart Acres for America Program

Sunrise Easement and St. Croix Corridor, Maine

Case Study Key Facts

Project type	Conservation easement
Key partnership	Walmart and the National Fish and Wildlife Foundation
Major donors	Elmina B. Sewall Foundation, Walmart, The Nature Conservancy, Pew Charitable Trusts, Open Space Institute, C.F. Adams Charitable Trust, Land for Maine’s Future Program, U.S. Fish and Wildlife Service Sweet Water Trust, North Cape Oil Spill Settlement Fund, The Conservation Fund
Contribution from Walmart	\$6.1 million
Total project cost	\$34.8 million
Location	Washington County, Maine
Project Size	312,000 acres
Capital campaign initiated for project	2003
Sunrise easement purchased	2005

Project Significance

The Sunrise Easement and St. Croix Corridor project in Maine was one of the largest private conservation projects in United States’ history. Future projects in New England through corporate sustainability programs such as Walmart’s Acres for America program have the potential to attract new funding for conservation necessary to protect large tracts of land.

Projects Overview

In 2003, a capital campaign called the Downeast Lakes Forestry Partnership began to protect the Farm Cove Community Forest, the Sunrise Easement, and the Saint Croix Corridor. To raise the funds necessary for the Sunrise Easement and the St. Croix Corridor, the Walmart Acres for America program played a key role. So far, the Walmart Acres for America program has made contributions for permanently protecting over 1,000,000 acres, an area greater than the state of Rhode Island, in its first ten years of operation through 61 conservation projects in 33 states. This program has now protected over 10 acres of land in America for every acre that Walmart has developed. After a renewal of the program in 2015, Acres for America will continue to operate until at least 2025. To purchase the Sunrise Easement and the St. Croix Corridor, the Acres for America program made the second largest contribution to the project by donating \$6.1 million through the National Fish and Wildlife Foundation (NFWF) to protect permanently these areas. The Conservation Fund provided bridge capital for this grant to close the project, which NFWF repaid in installment over a 10-year period. The largest contributor to this project, Elmina B. Sewall, contributed \$7.2 million to this project.

The Sunrise Easement and St. Croix Corridor now connect a block of over 1.3 million contiguous protected acres from Maine into Canada. The Sunrise Easement covers 312,000 acres of private forestland managed by Wagner timberlands. This is most of the Georgia-Pacific company's former Downeast Maine land base, outside of two large Community Forests owned by the Downeast Lakes Land Trust (see section on carbon offsets for more about DLLT) and another forest tract owned by the Conservation Fund. The New England Forestry Foundation holds the conservation easement on these lands, permanently guaranteeing they will not be developed and will instead be available to feed the forest products economy. The Maine Department of Conservation acquired a public access easement over the same lands, guaranteeing the public would forever be able to enjoy these lands for outdoor recreation. The \$34.8 million campaign began in 2003, and the land and easement purchases were completed in 2005. Bridge financing was used to complete the purchases, and the fundraising campaign formally concluded with an announcement in May of 2008.

Since this project represents one of the largest easements ever created in United States' history, it shows that corporate responsibility programs have a high impact potential to alter the course of conservation in New England through attracting private capital to conservation. As more programs of this nature continue to emerge across large companies, corporate sustainability with regards to offsetting the company's development footprint has the potential to become a major funding stream for conservation efforts in New England.

Increasing Funding for Land Conservation through Corporate Sustainability

Factors for past success

- Large corporations such as Walmart, Apple, and TD Bank may have more capital to create programs of this nature.
- Large tracts of northern forests are more economical for large corporations to purchase for sustainably sourcing paper for their supply chains.
- Consumer demand for sustainability encourages the integration of sustainably harvested forest products into corporate supply chains.
- Apple had a specific need to meet demand for a sustainable forest product supply chain.
- Conservation organizations have played an integral role in facilitating these corporate partnerships with Walmart, Apple, and TD Bank to fund conservation in New England.

Opportunities for scalability and replicability

- All companies who want to source paper sustainably for their supply chain could be participants in similar programs. The cumulative effects of all companies sustainably sourcing their virgin paper could have positive impacts for conservation in New England.
- Sustainably managed forests for paper supply chains could protect lands on massive scales (e.g. Apple's new initiated project in China).
- There are a multitude of high functioning conservation organizations in New England that could foster partnerships necessary for funding land protection through future corporate sustainability initiatives.
- Change in corporate strategy to integrate sustainability into the core of their operations will also stimulate the creation of similar programs.
- All companies who want to offset their store footprints could potentially be able to replicate and scale similar projects across New England, especially in the northern forests.

Water Quality Trading

Conservation Target

To cost effectively improve and protect water quality and achieve regulatory compliance.

Mechanism

A credit trading system in which a regulated entity meets its pollutant reduction mandate by purchasing reduction credits generated by a landowner who achieves commensurate pollutant reduction in another location.

Strategy Overview

Water quality trading is an emerging market-based strategy for water polluting entities to meet regulatory requirements cost effectively. Landowners produce water quality credits through land protection and ecosystem restoration; specifically, protected or restored land bordering water resources can function to absorb and filter chemical and nutrient pollutants or provide shade to reduce temperature pollution. A regulating agency approves these credits, if they adequately represent water quality improvements, for polluting entities to purchase. Corporations, municipal sewage treatment facilities, or other polluting entities can meet their regulatory requirements under the Clean Water Act (CWA) by purchasing credits that represent water quality improvements at a nearby pollution point source. Since more than half of the United States' assessed water resources are not compliant with the CWA, the opportunity exists for water quality trading programs to evolve and expand across the country (U.S. Environmental Protection Agency, 2016). From the assessed water resources in New England, a significant opportunity exists to implement water quality trading programs in the region. So far the Environmental Protection Agency (EPA) has provided water quality assessments in New England for 71% of all rivers and streams, 94% of all lakes, reservoirs, and ponds, and 32% of all bays and estuaries (U.S. Environmental Protection Agency, 2016). These assessments determined that at least 22,064 miles of rivers and streams, 569,617 acres of lakes, reservoirs, and ponds, and 958 square miles of bays and estuaries are impaired, which means they do not meet regulatory compliance under section 303(d) of the CWA (Figure 7.1).

The New England Interstate Water Pollution Control Commission (NEIWPCC) in working with its member states has listed nutrient pollution among its highest tier of priorities, stating that “[excess] nutrients are one of the leading causes of waterbody impairments in the northeast” (NEIWPCC, 2015). Although water quality trading programs have been created across the United States, the only active program in New England is Connecticut’s Nitrogen

Credit Exchange Program (NCEP) for the Long Island Sound. However, the NCEP program relies on trading nitrogen credits allocated to water pollution control facilities and does not currently integrate land protection and restoration as a means of producing credits for nitrogen removal (Connecticut Department of Energy and Environmental Protection, 2016).

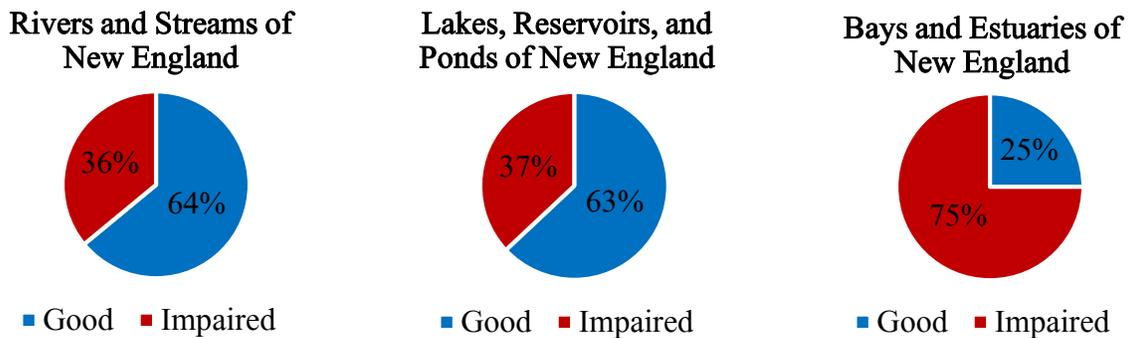


Figure 7.1 – Data collected from the National Summary of State Information on Water Quality (2012-2014), Environmental Protection Agency 2016.

Water resources classified as impaired due to pollution through the CWA must have Total Maximum Daily Loads (TMDLs) established to set a cap on each pollutant for that water resource¹. The establishment of TMDLs on impaired water resources by each state is critical to the creation of water quality trading markets so polluting entities can quantify the pollution reductions needed to reach compliance with the CWA. Of the impaired water resources in New England, those without established TMDLs include at least 7,622 miles of rivers and streams (35%), 222,105 acres of lakes, reservoirs, and ponds (39%), and 392 square miles of bays and estuaries (41%) (Figure 7.2). Assessment of the remaining water resources in New England will expand the scale and range of opportunities for water quality trading programs in the region. Also, further establishing TMDLs with emphasis on water resources with the greatest level of impairment will facilitate the emergence of water quality trading programs in New England.

¹ Some water resources are classified as impaired by the CWA due to low water flow, channelization, and damming and do not require TMDLs. Each state has different procedures and standards for listing its water resources as impaired. For example, New Hampshire has listed all of its water resources as impaired due to the dispersive nature of mercury pollution, while other states in New England have not taken this approach.

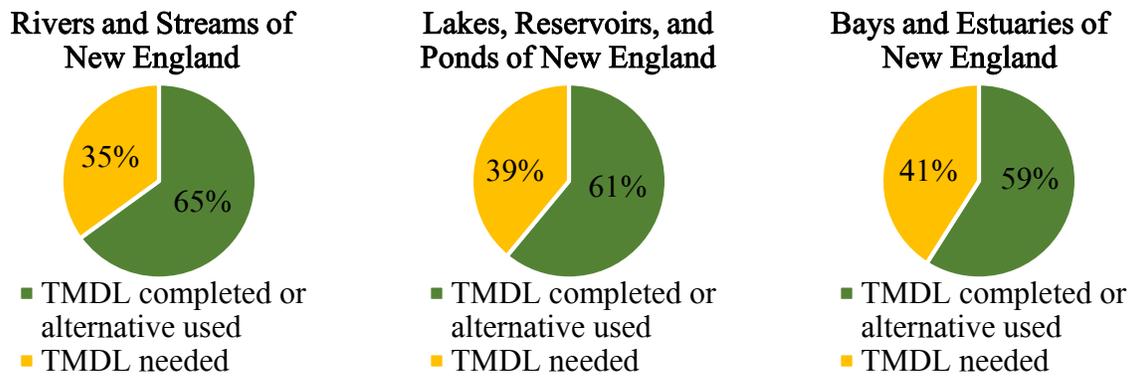


Figure 7.2 – Percentages of assessed water resources in New England that lack established TMDLs compared to assessed water resources with completed TMDLs or TMDL alternatives. TMDL alternatives include impairments controlled by an implementation action other than a TMDL and impairments by pollutants not recognized by the CWA for which a TMDL cannot be created. Data collected from the National Summary of State Information on Water Quality (2012-2014), Environmental Protection Agency 2016.

Although no water quality trading programs have been created in New England so far, the opportunity exists for states to generate significant new funding for conservation in the region using this mechanism while providing corporations and other entities another mechanism to achieve regulatory compliance under the CWA.

Investments in natural infrastructure for water quality can yield significant savings when compared with alternative gray infrastructure solutions and provide flexibility in their implementation as shown through the water quality trading program discussed in this section’s case study. Credits produced can function to reduce a diversity of pollution types such as temperature, nutrient, or chemical pollution. While water quality credits focus on reducing a certain type of pollution to that aquatic system, they often help to provide a suite of other ecological and economic benefits to that surrounding area and can occur across a range of sizes and in association with a range of water resources. Currently water quality trading is still in its early stages of implementation. As water quality trading programs continue to expand across the country, the opportunity for these programs to generate more funding for conservation in New England is also likely to increase.

Water Quality Trading Case Study

Medford Water Quality Trading Program, Oregon

Case Study Key Facts

Organizations involved	The Freshwater Trust, City of Medford
Acres restored and protected	100 acres of riparian habitat
Year initiated	2011
Temperature credits generated	600 million
Total cost of project	\$6.5 million
Total cost of alternative gray infrastructure project to make temperature reductions	\$15 million
Total taxpayer savings	\$7.5 million

Significance

This water quality trading program supported the protection of salmon fisheries in Oregon from future heat pollution. The project provides a case study of the successful implementation of a water quality trading program to advance land protection and deliver significant savings from commonly used gray infrastructure solutions. Similar projects could be implemented in New England to attract new private funding for land conservation associated with water resources.

Case Study Discussion

In 2011, the city of Medford, Oregon, created a water quality trading program to mitigate future heat pollution generated by their sewage treatment plant, which was predicted to exceed their allowable pollutant loading to the nearby Rogue River. To conform to federal wastewater pollution standards set by section 303(d) of the Clean Water Act (CWA) and receive a permit

renewal for their wastewater discharge, the City of Medford chose the creation of a water quality trading program as a cost effective solution to avoid predicted increases in heat pollution. By protecting about 100 acres of land and revegetating degraded riparian lands subject to the same TMDL, the shade produced as the trees grow will create future temperature reductions in the river. The purchase of credits associated with these temperature reductions will allow the City of Medford to both maintain compliance with regulations mandated by the CWA and provide funding for land protection. The sewage treatment plant for the City of Medford serves about 200,000 people and generates about 17 million gallons of wastewater per day. The wastewater produced lacks chemical pollutants but has slightly elevated temperatures and therefore causes heat pollution to the surrounding rivers.

The Freshwater Trust, a nonprofit organization based in Oregon, proposed the creation of a water quality trading program as a solution to allow the treatment plant to meet its regulatory requirements for water quality while providing a suite of other environmental benefits and significant cost savings compared to more commonly used gray infrastructure solutions. The additional benefits of conserving land and planting native trees along the riverbanks from this water quality trading program include carbon sequestration, erosion control, wildlife habitat, and nutrient absorption from agricultural runoff. Since the temperature reductions are to address projected future temperature increases, the creation of the water quality trading program several years in advance of the needed reductions allows the planted trees sufficient time to grow and provide the shade required. To ensure that these temperature reductions are met, the city must purchase twice the amount of credits for achieving the required temperature reductions. The city of Medford will purchase all 600 million temperature credits produced from this trading program with each credit representing a temperature reduction of one kilocalorie² per day.

Alternatively, the City of Medford could have constructed gray infrastructure solutions—such as chillers or holding ponds—to cool the wastewater from their sewage treatment plant. The costs to construct the least expensive of these gray infrastructure solutions, chillers or holding ponds, would be about \$15 million and these systems would only need to operate for a few weeks of the year during the salmon spawning. The water quality trading program, which involved planting trees provide shade benefits year round and additional environmental and economic benefits. To establish the water quality trading program, this project cost \$6.5 million and created a savings to taxpayers of \$7.5 million dollars when

²One kilocalorie is equivalent to the amount of energy needed to increase one liter of water by one degree Celsius.

compared with the least expensive gray infrastructure solution. The costs involved in creating this program are for planting, monitoring, maintenance, and stewardship of the trees used to produce shade credits along the Rogue River and its tributaries. The project will unfold over a 20- to 30-year period, which began in 2011.

Although this water quality trading program is a relatively small scale project, an opportunity exists to implement these programs in New England to advance land conservation while also reducing pollution to achieve compliance with the CWA. As water quality trading programs increase in scale and number, this finance strategy has the potential to supply credits to numerous polluting entities while protecting and restoring larger tracts land. Also, due to the flexibility of water quality trading programs to reduce diverse types of pollution across a range of water resources and scales, this strategy could have significant impact in generating new funding for protecting land associated with water resources in New England.

Increasing Funding for Land Conservation through Water Quality Trading

Major success factors

- The Freshwater Trust played a key role in proposing and developing this project. A similar third-party organization will be critical to provide professional expertise to drive development of these programs in New England even with the appropriate regulatory framework in place.
- The City of Medford took the initiative to implement this new solution to reduce projected increases in heat pollution from their sewage treatment plant in order to renew their permit for waste water discharge.
- The U.S. EPA provided valuable support in the creation of this program and the Oregon Department of Environmental Quality established a thermal load limit for the facility to comply with established TMDL for the Rogue River.
- The water quality trading program provided significant cost savings to taxpayers in comparison with alternative pollution reduction solutions.

Opportunities for scalability and replicability

- Flexibility to address multiple benefits including heat, nutrient, and chemical pollution reduction.
- Implementation across a variety of habitat types (wetlands, floodplains, rivers, streams, lakes, forest watersheds, estuaries, bays, ponds) and sizes.

- Successful implementation in similar temperate regions of North America, notably the Pacific Northwest, will increase likelihood of success in New England.
- Further assessment of water resources in New England along with the creation of TMDL's for all water resources impaired by pollution.
- Prioritize the creation of water quality trading programs in New England where water resources have the greatest level of impairment.
- Implement this conservation finance strategy on large scales.
- Create a pilot program in New England to facilitate replication of this strategy across the region.
- Include water quality trading programs in public infrastructure investment initiatives.

Compensatory Mitigation

Conservation Target

To reduce development impacts on natural landscapes and endangered species at or near the site of impact.

Mechanism

A law requiring developers to avoid and minimize their environmental impacts on-site and then to compensate for unavoidable impacts through the protection, restoration, or enhancement of nearby lands.

Strategy Summary

Compensatory mitigation originally emerged in the United States to reduce the rapid loss of wetlands due to development and to reduce impacts on federally listed species after the passage of the Clean Water Act (CWA) and the Endangered Species Act (ESA) in the 1970's. In 1989, the George H.W. Bush administration also adopted no-net-loss of wetlands as a national policy and all subsequent presidential administrations have reaffirmed this commitment, which further supports the use of compensatory mitigation for wetland losses. Compensatory mitigation is the process by which developers must first minimize adverse impacts of their projects on-site and then protect, restore, or enhance land, to compensate for unavoidable development impacts.

Where on-site mitigation of unavoidable impacts by the developer is not possible, there are three mechanisms for providing off-site compensatory mitigation to achieve regulatory compliance listed in order of preference by the EPA (2016): mitigation banking, in-lieu fee programs (ILF), and permittee responsible mitigation (PRM). A mitigation bank is an entity that generates qualified credits and then sells them to developers to offset any unavoidable loss of natural resources to achieve regulatory compliance. The credits sold to a developer by a mitigation bank represent the protection of land or habitat type at another site located near the impacted development area with a similar ecological function. Mitigation banking is the most preferred option for off-site mitigation by the EPA because mitigation occurs before project development and mitigation banks can consolidate mitigation needed by multiple developers into larger conservation projects to provide greater ecological function and resilience. However, the development of mitigation banks generally occurs only in areas with high development pressures to meet the demands of several developers. ILF programs involve a third-party conservation organization or state agency, which collects fees from developers to conduct mitigation projects, often after development occurs. PRM is the mitigation of a development project by the

developers themselves either off-site or adjacent to the development site. As an alternative to PRM, Maine established an ILF program through a partnership between Maine Department of Environmental Protection, the U.S. Army Corps of Engineers and The Nature Conservancy. Proceeds from the ILF program are distributed through the Maine Natural Resource Compensation Program to restoration and protection projects.

So far, New England has experienced limited demands for compensatory mitigation and the lack of mitigation bank development for the following reasons (Environmental Law Institute, 2002):

- 1) Apparent minimal loss of wetlands due to appropriate federal and state level regulation and enforcement.
- 2) Low concentrations of federally listed species under the Endangered Species Act.
- 3) Small service areas that limit accessibility and scale of mitigation banks.
- 4) The development of state level In-Lieu Fee programs (see Maine example above) instead of mitigation banks to meet modest demands for off-site mitigation.

While the need for compensatory mitigation has been limited so far in New England for development impacts on wetlands and federally listed species, it can work effectively to reduce development impacts across other land types or species given the appropriate regulatory environment. An opportunity exists to generate more funding for conservation by requiring compensatory mitigation for development impacts on forests in New England. For example, the state of Maryland requires compensatory mitigation for forest loss and allows for the creation of county level forest mitigation banks, which emerged in 1991 after the passage of Maryland's Forest Conservation Act. Compensatory mitigation now functions as a key component for achieving no-net-loss of forests in the state required by Maryland's Forest Preservation Act of 2013. Maryland's Forest Preservation Act of 2013 was the first state law in the United States to require no-net-loss of forests and preserve a fixed percentage of the state's land cover as forests (40%).

From 1985-2011, New England experienced 387,000 acres of deforestation or an average of 24,000 acres of forest loss per year (Oloffson et al., 2016). Also, 76% of New England forests are privately owned by family forest owners, private non-profit organizations, or corporations (Figure 8.1).

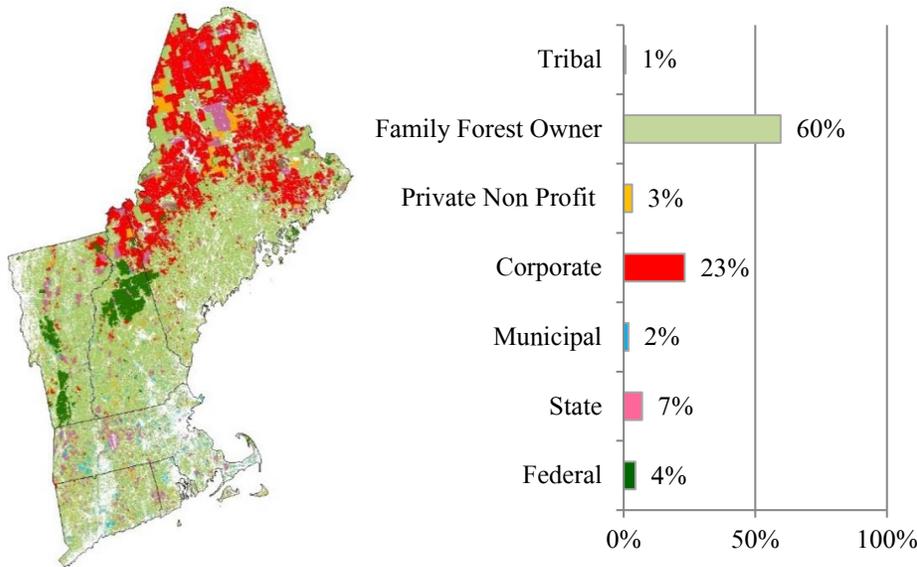


Figure 8.1 – Forest Ownership in New England. Figures from Recent Land Use Trends in New England. Harvard Forest 2016.

This substantial rate of forest loss and the high percentage of privately owned forests in New England suggests compensatory mitigation for forest loss could be a viable conservation finance strategy for the region. Compensatory mitigation requirements for forest impacts would generate more funding for land conservation from developers compensating for their impacts and also through stimulating private landowners to protect existing or newly planted forests in order to participate in forest mitigation banking markets. Compensatory mitigation for forest loss would also function on the front lines of conservation to directly counteract forest loss in the areas of greatest development pressure. Since 53% of forest loss in New England occurs through low-density residential development (Oloffson et al., 2016), compensatory mitigation would likely have its greatest impacts in these areas. Compensatory mitigation for development impacts on forests, potentially implemented through no-net forest loss laws, offers an opportunity to generate significant new funding for conservation in New England while also directly counteracting forest loss from development.

Compensatory Mitigation Case Study

Forest Loss Mitigation and Forest Mitigation Banks

Montgomery County, Maryland

Case Study Key Facts

County level required forest mitigation impacts (1994-2015)	Existing forest protected: 10,341 acres Newly planted forest protected: 2,280 acres Forest acres cleared: 4,103 acres
Total forest mitigation bank acres in Montgomery County (2016)	Protected newly planted forest: 209 acres Protected existing forest: 1,189 acres Total bank acres: <u>1,398 acres</u>
Bank size range (2016)	Protected newly planted forest banks: 2-56 acres Protected existing forest banks: 2-149 acres All banks: <u>2 - 149 acres</u>
Number of forest banks created in Montgomery county (2016)	Banks with available credits: 8 Banks sold out of credits: 32 Total banks: <u>40</u>
Average bank size (2016)	35 acres
Average bank credits sold per year (2008 -2015)	52 credits

Significance

Montgomery County in Maryland has successfully reduced its forest loss through required compensatory mitigation, which also allows for the creation of county level forest mitigation banks. In New England, the implementation of compensatory mitigation for forest loss and county level forest mitigation banks could generate significant new funding for land conservation from developers compensating for their forest impacts and from private landowners protecting existing or newly planted forests to participate in forest mitigation bank markets.

Project Overview

Montgomery County has made significant reductions to the forest loss after the passage of the Forest Conservation Act (FCA) in 1991, which requires compensatory mitigation in the state of Maryland for impacts resulting from “any subdivision, project plan, grading permit, or sediment control permit on a unit of land 40,000 square feet or greater (nearly an acre)” (Forest Conservation Act of 1991). The FCA also allows for the creation of county level forest mitigation banks to provide a more effective solution for off-site mitigation when on-site mitigation is not possible. The Forest Preservation Act (FPA), which became law in the state of Maryland in 2013, reinforces the reduction of forest loss through the expansion and development of compensatory mitigation and county level forest mitigation banks by requiring no-net-loss of forests and that the state remain 40% forested (Forest Preservation Act of 2013). Although the Maryland Department of Natural Resources Forest Service oversees administration and enforcement of compensatory mitigation for forest loss across the state, these requirements are implemented by local jurisdictions and forest mitigation banks are approved at the county level, which is why this case study examines mitigation for forest loss at the county level.

Through required compensatory mitigation for forest loss from 1994-2015, Montgomery County has permanently protected 10,341 acres of existing forest and 2,280 acres of newly planted forest while 4,103 acres of forest have been cleared (Figure 8.2). The net forest loss to Montgomery County over this 22 year period was 1,823 acres while the total land area permanently protected as a result of mitigation for forest loss was 12,621 acres (Figure 8.3). Although mitigation has not eliminated forest loss in Montgomery County, it functions to minimize forest loss from development projects on-site, to create and protect newly planted forest to reduce forest losses, and also to protect existing forest to avoid further forest conversion.

As indicated by figure 8.2, forests are not mitigated on an acre per acre basis but instead required mitigation is calculated through a complex formula, which factors in forest cover thresholds by land use type, the size of the property, the size of the existing forest, and the amount of forest cleared (Montgomery County Planning Department, 2016). Based on these factors, the formula then determines the combined number of acres of existing forest and newly planted forest that must be protected after development occurs. For example, a 100-acre tract of an agriculture and resource area with 50 acres of existing forest cover with 25 acres of forest cleared will require the protection of the remaining 25 acres of forest on-site and also the planting and protection of 50 acres. Under this same scenario, if the land use type was a medium-density residential area instead of an agriculture and resource area, it would still require the

protection of the remaining 25 acres of forest cleared on-site but would only require the planting and protection of 6.25 acres due to differences in forest cover thresholds by land use type included in the formula. This required forest planting and protection in either of these instances must preferably occur on-site, but if on-site mitigation is not possible then mitigation must occur off-site.

Effects of Forest Loss Mitigation in Montgomery County

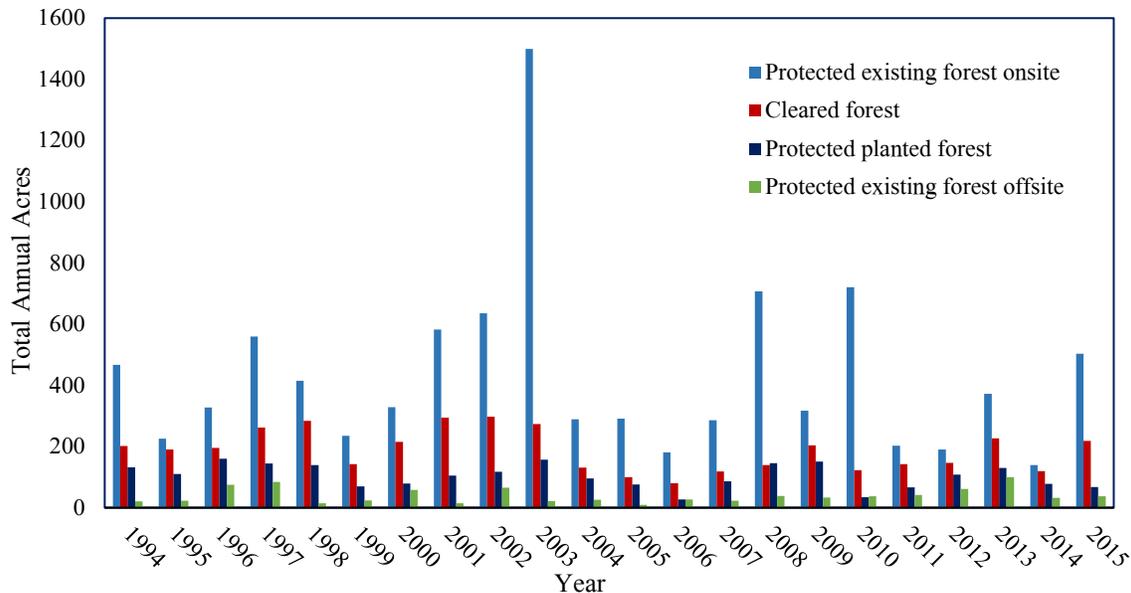


Figure 8.2 – Forests retained, cleared, and planted in Montgomery County Maryland from 1994 -2015. Montgomery County Planning Department 2015.

The preferred sequence of compliance measures to mitigate forest loss in Maryland is as follows: on-site retention, on-site planting, off-site planting, off-site retention, mitigation banking, and in-lieu-fee payment. Using in-lieu-fee as “a last resort and a high-cost option” helps to give preference to banking and stimulate forest mitigation banking markets (Maryland Ecosystem Services Working Group, 2001). To create forest mitigation banks, landowners must permanently protect their forest under conservation easement. Although credits must be purchased within the same county as the development impacts, it is preferable that credits are purchased within the same watershed as well. As of 2016, Montgomery County has created 40 mitigation banks with 32 of those banks having sold all of their credits and 8 of those banks with credits currently available for developers to purchase. These 40 forest mitigation banks have protected a total of 1,398 acres.

In addition to compensatory mitigation for forest loss, the FPA also requires the implementation of several other credit trading systems and financial incentives to support no-net-loss of forests. These credit trading systems include, “a carbon credit or carbon sequestration program, a clean water credit trading system, an environmental services program, and a renewable energy credit trading system” (Forest Preservation Act of 2013). Also to help reduce forest loss in the state, Maryland has a financial incentive where landowners can deduct between 3 and 1,000 acres worth of forestry expenses from their income tax liability. This incentive promotes a range of private landowners to “convert residential turf to trees, and increase, retain and manage forest cover on these properties” (Maryland Department of Natural Resources 2013). Forestry expenses eligible for tax credits include tree plantings, creating and maintaining forested stream buffers, controlling invasive species, and other best management practices that improve forest health. The Forest Conservation Act also waives forest loss mitigation requirements for development projects in areas previously developed and covered by paved surfaces to promote redevelopment of areas that have already been converted for non-forest use. Several other Maryland state laws and programs also help to support no-net-loss of forests in the state including the Reforestation Law, which requires the replacement of trees removed by highway construction, the Roadside Tree Law, which requires permits for any roadside tree removal and pruning, and the TREE-MENDOUS program, which helps provide affordable trees for citizens to plant on public land.

Requiring mitigation for forest loss in New England through the adoption of no-net-loss of forest laws would provide an opportunity to generate significant new funding for conservation from developers mitigating their forest impacts. Also, allowing the creation of county level forest mitigation banks would generate new funding by stimulating private landowners to permanently protect existing forests or newly planted forests to participate in forest mitigation bank markets. This conservation finance strategy would also function most effectively in areas of high development pressure to act directly against forest loss. Since New England’s heavily forested but densely populated landscape currently experiences 24,000 acres of forest loss per year and 76% of New England’s forests are privately owned, required mitigation of forest losses and forest mitigation banks could significantly reduce forest loss and also generate new funding for conservation.

Increasing Funding for Land Conservation through Compensatory Mitigation

Factors for past success

- Compensatory mitigation can reduce impacts of development on a diversity of land types and species.
- Compensatory mitigation functions most effectively in areas with high development pressures with moderately sized service areas.
- Compensatory mitigation provides flexibility in implementation in that unavoidable development impacts can be mitigated on-site by the developers themselves or off-site through mitigation banks, in-lieu-fee programs, or permittee responsible mitigation.
- Mitigation bank credits provide the most effective option for off-site mitigation in that banks can consolidate required mitigation into larger conservation projects with greater ecological function and resilience; purchasing credits for off-site mitigation is much more convenient for developers than conducting off-site mitigation themselves.

Opportunities for scalability and replicability

- Increased development pressures, particularly with regard to large infrastructure projects with unavoidable impacts, will yield greater impacts through required mitigation on forests if implemented.
- Streamlining the process for creating forest mitigation banks and educating private landowners about creating forest mitigation banks on their property.
- The creation of a pilot program at the county level in New England for compensatory mitigation of forest loss and forest mitigation banks

Summary of Strategies Examined

While several of these strategies will require long-term coordinated action to implement, these strategies nevertheless have all been implemented in some capacity either in New England or elsewhere within the United States. Therefore, these strategies are worth consideration for expansion in New England according to their impacts, scalability, and feasibility outlined below.

Strategy	Primary impacts	Scalability	Barriers	New funding	Development phase	Focus area
Forest Carbon Offsets	-Carbon sequestration -Carbon offset revenues	High	Moderate	Yes	Emerging	Working forests
Community Forests	- Recreation/ Tourism - Economic development - Cultural and natural heritage preservation -Community development	Moderate	Moderate	Yes	Emerging	Municipal level
Green Bonds	-Green infrastructure development	High	Low	Not yet, but facilitates access to debt capital	Emerging	State level or municipal level
Real Estate Taxes for Conservation	- Smart growth - Cultural and natural heritage preservation - Recreation/ Tourism	High for CPA-like policies Low for RETT policies	High	Yes	Emerging	State level or Municipal level
Sales Taxes for Conservation	- Cultural and natural heritage preservation - Recreation/ Tourism - Maintaining healthy ecosystems	High	High	Yes	Emerging	State level
Corporate Responsibility	- Offset environmental footprint of supply chains, buildings, and general operations	Moderate	Low	Yes	Emerging	Regional level
Water Quality Trading	-Water quality enhancement	Moderate	Moderate	Yes	Incubation	Regional level or municipal level
Compensatory Mitigation	- Mitigate development impacts on landscapes and species	Moderate	Moderate	Yes	Emerging with regard to mitigation of forest loss	County level

Additional Strategies to Consider

This report focuses on eight broad finance strategies, yet there are many others that conservationists are either already trying or have proposed. In recognition of the wide-world of opportunities, we offer the following additional strategies that warrant investigation. These additional strategies fall under two core approaches: *increasing funding* for land conservation and *lowering the costs* of conservation.

Increasing Revenues for Land Conservation

- 1) **Raise revenues from other sectors.** For example, finding the common ground between other sectors such as climate adaptation/mitigation finance, health care, and water quality infrastructures to focus a small proportion of those revenues towards land conservation and reduce costs in those sectors.
- 2) **Link green infrastructure with grey infrastructure investments.** Explore the use of Clean Water State Revolving Funds—public finance that is typically used to finance grey infrastructure water treatment systems—and general infrastructure financing to fund land protection and/or restoration that reduces pollutant load on water quality systems.
- 3) For land conservation that directly mitigates climate change- or natural disaster-induced impacts, **engage beneficiaries of future avoided costs of damage** (e.g., insurance companies, municipalities, developers) to invest in risk-reducing conservation projects.
- 4) **Link community health to open space.** Make the case that new investments in open space will increase healthy lifestyles and reduce healthcare costs to develop a business case for hospitals and insurance companies for funding land protection.

Lowering the Cost of Land Protection

The conservation easement fundamentally reduced the cost of protection compared to fee acquisitions, and led to an increase in the pace of land protection in New England. Explore new strategies to reduce further the costs of protection:

- 1) **Increase the proportion of conservation easement donations.** Increasing tax incentives for private landowners to protect their land will lower the effective cost of protecting land for land trusts. For example, Massachusetts currently has the only *refundable tax credit* in the U.S.
- 2) **Reduce the transaction costs associated with doing land deals.** Invest more in capacity building for land trusts to aggregate projects and streamline due diligence to reduce the cost of transactions.

The Future of Conservation Finance in New England

Future investment in land protection across New England is essential to maintain healthy ecosystem function, sustainable economic growth, and vibrant communities in the face of forest conversion, climate change, and other disturbances. The conservation finance strategies examined in this report exhibit diverse economic approaches to financing land protection ranging from market-based strategies, community-based resource management, public fiscal policies, and corporate sustainability initiatives. Other approaches not assessed in this report—such as targeting a portion of infrastructure investments for natural infrastructure and working with insurance firms on climate and disaster risk reduction—should also be addressed. However, the success of any of these strategies will depend largely upon enhancing existing public funding programs and developing new strong public-private partnerships. The stacking of public and private capital is critical. Many private investments in conservation require reliable public funding streams as part of their exit strategies. This report suggests that through creating more stable and sufficient public funding sources in New England, more private capital will be leveraged.

While some of the strategies detailed in this report are aspirational, others have already been implemented somewhere. In order to accelerate the pace of land protection, it will take both incremental gains in finance, as well as some game-changing innovations. Highstead's goal in sharing this working paper and convening New England's conservation finance experts is to stimulate a dialogue, embolden our partners, and identify high-probability strategies we can advance together. If there is any doubt as to what can be achieved, consider this: before 1980 when the IRS bestowed a tax deduction on landowners who gifted conservation easements and 1981 when the Uniform Conservation Easement Act was approved, there were few private lands legally protected from development. Thirty-six years later 4.2 million acres of New England are permanently protected by conservation easements. How will we bend the curve this time?

Acknowledgements

We are sincerely grateful for the substantial contributions from the following individuals for supplying data, agreeing to be interviewed, and providing written material:

Rebecca Brown, Executive Director, Ammonoosuc Conservation Trust; **Mary Buchanan**, Graduate Student, University of Connecticut, Storrs; **Tom Duffus**, Vice President, Midwest Region and Northeast Representative, Conservation Acquisition, The Conservation Fund; **Carolyn Mansfield duPont**, Investment Associate, Massachusetts Clean Energy Center; **Julie Renaud Evans**, Program Director, The Northern Forest Center; **David Foster**, Director, Harvard Forest; **Maggie Gardner**, Conservation Intern, Highstead Foundation; **David Kittredge**, Professor, University of Massachusetts, Amherst; **Dylan Jenkins**, Vice President, Portfolio Development, Finite Carbon; **Martha Lyman**, Independent Community Forest Expert; **Jennifer Melville**, Vice President, Conservation Grants and Loans, The Open Space Institute; **Kimberly Meneo**, Conservation Intern, Highstead Foundation; **David Montague**, Executive Director, Downeast Lakes Land Trust; **Katherine Nelson**, Planner Coordinator, Montgomery County Planning Department; **Joe Pavelko**, Assistant Director, Lessard-Sams Outdoor Heritage Council; **David Primozych**, Conservation Director, The Freshwater Trust; **Robert Russell**, Executive Director, Merrimack River Watershed Council; **John Scarinza**, Chairman and Planning Board Representative, Randolph Forest Commission; **Drew Smith**, Deputy Assistant State Treasurer, Commonwealth of Massachusetts Treasury; **Karin Tilburg**, Deputy Executive Director, Forest Society of Maine; **Matthew Zieper**, National Research Director, Trust for Public Land

We are grateful for the additional insights from:

Bridget Boule, Head of Market Analysis, Climate Bonds Initiative; **Christopher Busch**, Environment, Policy and Social Initiatives, Apple; **Susan Campese**, Administrator and Finance Manager, Nantucket Islands Land Bank; **Kim Cartwright**, Media Specialist, Arkansas Fish and Game Commission; **Brian Dangler**, Vice President, Director of Forestlands Acquisitions and Finance, The Conservation Fund; **Nick Dilks**, Managing Partner, Ecosystem Investment Partners; **Richard Friesner**, Director, Water Quality Programs, New England Interstate Water Pollution Control Commission; **Brian Hall**, GIS Research Assistant, Harvard Forest; **Marian Honeczy**, Urban Forestry Programs Manager, Maryland Department of Natural Resources; **Marcus Kilburn**, Real Estate Officer, Arkansas Fish and Game Commission; **Nick Kline**, Program Director, Coalition for Green Capital; **Rodger Krussman**, East Division Director of Land Protection, Trust for Public Land; **James Lengyel**, Executive Director, Martha's Vineyard Land Bank Commission; **Chase Mack**, Communications Director, Community Preservation Coalition; **Jena Thompson Meredith**, Vice President, Business Partnerships, The Conservation Fund; **Luca Morreale**, Research Assistant, Harvard Forest; **Terrence Nolan**, Senior Vice President, Conservation Transactions, Open Space Institute; **Keith Ross**, Senior Advisor, LandVest; **Stuart Saginor**, Executive Director, Community Preservation Coalition; **Dany Senay**, Director, Hereford Community Forest; **Ann Simonelli**, Media Relations Director, The Conservation Fund; **Heidi Tarbox**, Administrative Assistant, Block Island Land Trust; **Jonathan Thompson**, Senior Ecologist, Harvard Forest; **William Tucker**, Senior Communications Associate, Forest Trends Association; **Elizabeth Wyman**, Director of Education and Outreach, Ammonoosuc Conservation Trust

Finally, we thank our Highstead colleague, **Cheryl Daigle**, for her editorial assistance.

References

(Organized by Section)

Introduction References

Buchanan, M. (2016). *Public Conservation Funding in New England Recent Trends on Government Spending in New England*. Retrieved from

<http://www.wildlandsandwoodlands.org/sites/default/files/Public%20Funding%20LR.pdf>

Conservation Finance from Niche to Mainstream: The Building of an Institutional Asset Class.

(2016, January). *Credit Suisse Web site*. Retrieved from [https://www.credit-](https://www.credit-suisse.com/media/assets/corporate/docs/about-us/responsibility/banking/conservation-finance-en.pdf)

[suisse.com/media/assets/corporate/docs/about-us/responsibility/banking/conservation-finance-en.pdf](https://www.credit-suisse.com/media/assets/corporate/docs/about-us/responsibility/banking/conservation-finance-en.pdf)

Harvard Forest, Harvard University. (2010). *Wildlands and Woodlands A Vision for the New England Landscape*. Petersham MA: Foster, Donahue, Kittredge, Lambert, Hunter, Hall, Irland, Lilieholm, Orwig, D'Amato, Colburn, Thompson, Levitt, Ellison, Keeton, Aber, Cogbill, Driscoll, Fahey, Hart.

Innovate to Meet the Challenge of Conservation: Jim Levitt at TEDxBeaconStreet. (2013, January). Youtube Web site. Retrieved from

https://www.youtube.com/watch?v=w5K2AR3L_To

New Hampshire's Return on Investment in Land Conservation. (2014, June). *The Trust for Public Land Web site*. Retrieved from <https://www.tpl.org/sites/default/files/nh-state-roi-report.pdf>

The Economic Impact of State Parks, Forests and Natural Resources under the Management of the Department of Environmental Protection. (2011, June). *Connecticut Forest and Park Association Web site*. Retrieved from

<http://www.ctwoodlands.org/sites/default/files//2011%20Economic%20Impact%20Study.pdf>

The Return on Investment in Parks and Open Space in Massachusetts. (2013, September). *The Trust for Public Land Web site*. Retrieved from

<https://www.tpl.org/sites/default/files/cloud.tpl.org/pubs/benefits-ma-roi-report.pdf>

The Return on the Investment in Land for Maine's Future. (2012, February). *The Trust for Public Land Web site*. Retrieved from <http://cloud.tpl.org/pubs/local-maine-conseconomics-2012.pdf>

Forest Carbon Offsets References

- ARB Compliance Offset Program U.S. Forest Offset Protocol Frequently Asked Questions. (2013, October 5). *California Air Resources Board Web site*. Retrieved from http://www.arb.ca.gov/cc/capandtrade/protocols/usforest/resources/faq_102913_post.pdf
- ARB Offset Credits Issued. (2016). *California Air Resources Board Web site*. Retrieved August 19, 2016 from https://www.arb.ca.gov/cc/capandtrade/offsets/issuance/arb_offset_credit_issuance_table.pdf
- California Carbon Dashboard Source Data. (2016). *California Carbon Dashboard Web site* [Data file]. Retrieved August 19, 2016 from <http://calcarbodash.org/csv/live%20graphing%20prices%20and%20volumes.csv>
- Carbon Market: Overview - Ecosystem Marketplace. (2016). *Ecosystem Marketplace Web site*. Retrieved from <http://www.ecosystemmarketplace.com/marketwatch/carbon/>
- Carney, S. (2012). *Aggregation Overview* [PowerPoint slides]. Retrieved from http://eea.epri.com/pdf/ghg-offset-policy-dialogue/workshop12/5-Carney_EPRI-Offsets-W12_Financing-Forest-Aggregation.pdf
- Carney, S. (2012). *Managing Forest Carbon Risk* [PowerPoint slides]. Retrieved from: <http://www.climateactionreserve.org/wp-content/uploads/2009/05/Finite-Carbon-CAR-Workshop-Slides-Sean-Carney.pdf>
- Chapter 7, Grow More Wood. (2014). *New England Forests: The Path to Sustainability*. Retrieved from http://newenglandforestry.org/wp-content/uploads/2016/04/7._Grow_More_Wood_061214-SMALL.pdf
- Forest Carbon Offsets. (2016). *Downeast Lakes Land Trust Web site*. Retrieved from <https://www.downeastlakes.org/conservation/your-community-forests/forest-carbon-credits/>
- Hamrick, K., Goldstein, A. (2015). *Ahead of the Curve State of the Voluntary Carbon Markets*. Retrieved from http://forest-trends.org/releases/uploads/SOVCM2015_FullReport.pdf
- Henderson, L. (2012, May 24). *Verification Assessment Report For: CAR657 - Finite Carbon - Farm Cove Community Forest Project in Grand Lake Stream, Maine USA*. Retrieved from http://www.rainforest-alliance.org/sites/default/files/climate_project/farmcove-car-verification-audit-report.pdf

- Indicator 5.22: Total forest ecosystem carbon pools and fluxes. (2014, April 29). *United States Forest Service Web site*. Retrieved from <http://www.fs.fed.us/research/sustain/criteria-indicators/indicators/indicator-522.php>
- Jenkins, D. (2015, May-June). *Cash for Carbon Revisited*. Retrieved from <http://www.finitecarbon.com/wp-content/uploads/2015/06/FiniteCarbon-FLA-article-June-2015.pdf>
- Kellndorfer, J., Walker, W., LaPoint, E., Bishop, J., Cormier, T., Fiske, G., Hoppus, M., Kirsch, K., and Westfall, J. (2012). *NACP Aboveground Biomass and Carbon Baseline Data (NBCD 2000), U.S.A., 2000*. Retrieved from <http://dx.doi.org/10.3334/ORNLDAAAC/1081>
- North America - Ecosystem Marketplace. (2016). *Ecosystem Marketplace Web site*. Retrieved from <http://www.ecosystemmarketplace.com/marketwatch/carbon/north-america/>
- Offset Projects List. (2016). *American Carbon Registry Web site*. Retrieved August 19, 2016 from <https://acr2.apx.com/myModule/rpt/myrpt.asp?r=111>
- Tercek, M. (2009). Protecting Forests and lands through Environmental Markets and Finance. In J. Carlson, B. Garcia, C. Jahns, E. Roberts (Eds.), *Carbon Finance II Investing in Forests for Climate Protection* (pp. 33-49). New Haven, CT: Center for Business and Environment at Yale.
- Turning over a New Leaf: State of the Forest Carbon Markets. (2014). *Forest Trends Web site*. Retrieved from <http://www.forest-trends.org/fcm2014.php>
- Climate Change 2007: Synthesis Report (2007). *International Panel on Climate Change Web Site*. Retrieved from https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf
- VCS Offset Project Registry. (2016). *Verified Carbon Standard Web site*. Retrieved August 19, 2016 from http://database.v-c-s.org/VCS_OPR

Community Forest References

- Community Forest Fund Final 2016 with Acres. (2016). *Open Space Institute*. [Microsoft Excel file]. Retrieved August, 23 2016 from email correspondence with Jennifer Melville, Vice President Conservation Grants and loans, of the Open Space Institute.
- Community Forest Program. (2016, August 12). *U.S. Forest Service Web site*. Retrieved from <http://www.fs.fed.us/cooperativeforestry/programs/loa/cfp.shtml>

- Community Forest Plan: Cooley-Jericho Community Forest. (2014, January). *Ammonoosuc Conservation Trust Web site*. Retrieved from <http://cooley-jericho.org/wp-content/uploads/2014/05/Community-Forest-Plan-USFS-Final.pdf>
- Completed CF Projects Updated August 2016. (2016, August). *Northern Forest Center*. [Microsoft Word file]. Retrieved August, 19 2016 from email correspondence with Julie Renaud Evans, Program Director, of the Northern Forest Center
- Cook, B. (2014). *Establishing Roots Recommendations for Land Trusts' Role in Community Forestry*. Retrieved from http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/8563/Cook_MP_Final.pdf?sequence=1
- Lyman, M. W. (2007, August). *A Community Investment Strategy Community Forests*. Retrieved from https://northernforest.org/images/resources/community-forests/Community_Forests_Report_1.7MB.pdf
- Lyman, M.W., C. Grimm, and J. Renaud-Evans (2014). *Community Forests: Wealth Creation Strategy for Rural Forested Communities*. Community Development Society. Vol 45, No. 5. 474-489. Retrieved from <http://dx.doi.org/10.1080/15575330.2014.951374>
- New Hampshire Maple Syrup in Traditional Jugs (2016). *Fuller's Sugarhouse LLC of Lancaster Web site*. Retrieved from <https://fullerssugarhouse.com/product/new-hampshire-maple-syrup-in-traditional-jugs/>
- North Country Towns Work On A Community Forest. (2012, December 31). *New Hampshire Public Radio Web site*. Retrieved from <http://nhpr.org/post/north-country-towns-work-community-forest>
- Northeast Maple Syrup Production (2015). *United States Department of Agriculture National Agricultural Statistics Service Web Site*. Retrieved from https://www.nass.usda.gov/Statistics_by_State/New_England_includes/Publications/Crop_Production/Maple%20Syrup%202015.pdf
- Macfaden, S. (2015). *Northeastern States Research Cooperative Web site*. Retrieved from <http://nsrcforest.org/project/inventory-town-forests-vermont>
- McCullough, R. (2015). *Vermont Urban and Community Forestry Web site*. Retrieved from http://vtcommunityforestry.org/sites/default/files/pictures/Resource/new_england_town_forest_timeline.pdf

Randolph Community Forest Second Stewardship Plan - 2014 to 2023 (2013). *Town of Randolph Web site*. Retrieved from http://randolphforest.org/wp-content/documents/plan/Second%20RCF%20Stewardship%20Plan%20with%20Maps_2014.pdf

The Master Plan for the Town of Randolph, NH 2016 (2016). *Town of Randolph Web site*. Retrieved from <http://www.randolph.nh.gov/PBDs/Randolph%202016%20Masterplan.pdf>

Thompson, J., Plisinski, J., Morreale, L., Blumstein, M., Duveneck, M., Hall, B., Rodríguez-Gonzalez, M., (2016). *Recent Land Use Trends in New England, Scenarios, Harvard Forest* [PowerPoint slides]. Retrieved from https://s3rcn.files.wordpress.com/2016/01/rt_slides_all_states.pdf

Green Bonds References

Bond Structures Typically Used by Green Banks (2016, June). *Coalition for Green Capital* [Powerpoint Slides]. Retrieved November, 4 2016 from email correspondence with Nick Kline, Program Director, Coalition for Green Capital.

DC Water, Goldman Sachs and Calvert Foundation pioneer environmental impact bond (2016, September). District of Columbia Water and Sewer Authority Web site. Retrieved from <https://www.dewater.com/news/listings/documents/DC%20Water%20EIB%20Fact%20Sheet%20FINAL%2009-29-16.pdf>

DuPont, C. M., Levitt, J. N., Bilmes, L. J. (2016, January). *Green Bonds and Land Conservation: The Evolution of a New Financing Tool*. Retrieved from http://heep.hks.harvard.edu/files/heep/files/dp67_dupont-levitt-bilmes.pdf?m=1451939638

Green Bond Impact Report. (2015, June). *World Bank Web site*. Retrieved from <http://treasury.worldbank.org/cmd/pdf/WorldBankGreenBondImpactReport.pdf>.

Green Bond Principles. (2016, June). *International Capital Market Association Web site*. Retrieved from <http://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/green-bonds/green-bond-principles/>

Kidney, S. (2016, January). *2015 Year End Review - From Tall Trees to Many Green Shoots: The Evolution of the Green Bond Market Continues with 2015 seeing \$41.8bn Green Bonds Issued – That’s the Biggest Ever!* Retrieved from <https://www.climatebonds.net/2016/01/2015-year-end-review-tall-trees-many-green-shoots-evolution-green-bond-market-continues-2015>>.

MassGreenBonds 2013 Series D First Quarterly Investor Impact Report Quarter Ended August 2013 Investing in a Greener, Greater Commonwealth. (2013, August). *The Commonwealth of Massachusetts Investor Program Web site*. Retrieved from [http://www.massbondholder.com/sites/default/files/files/QE%20August%202014%20Green%20Report\(1\).pdf](http://www.massbondholder.com/sites/default/files/files/QE%20August%202014%20Green%20Report(1).pdf)

MassGreenBonds 2013 Series D Final Investor Impact Report January 2015 Investing in a Greener, Greater Commonwealth. (2015, January). Massachusetts Treasury, Jan. 2015. *The Commonwealth of Massachusetts Investor Program Web site*. Retrieved from <http://www.massbondholder.com/sites/default/files/files/Second%20Green%20Report%20-%20FINAL.pdf>

Supplement Dated September 12, 2014 to the Preliminary Official Statement Date September 9, 2014 Relating to the Commonwealth of Massachusetts \$350,000* General Obligation Bonds Consolidate Loan of 2014, Series E (Green Bonds). (2014, September). *The Commonwealth of Massachusetts Investor Program Web site*. Retrieved from [http://www.massbondholder.com/sites/default/files/files/MA%20GO%202014%20Series%20E%20POS%20\(Green\)%20unsecured.pdf](http://www.massbondholder.com/sites/default/files/files/MA%20GO%202014%20Series%20E%20POS%20(Green)%20unsecured.pdf)

The Commonwealth of Massachusetts \$350 Mm Series 2014 E General Obligation Green Bonds. (2014, September). *The Commonwealth of Massachusetts Investor Program Web site*. Retrieved from <http://www.massbondholder.com/sites/default/files/files/Green%20Bonds%20Investor%20Presentation%209-10-14.pdf>

What Are Green Bonds? (2015, January). *World Bank Web site*. Retrieved from http://treasury.worldbank.org/cmd/pdf/What_are_Green_Bonds.pdf

U.S. Municipal Green Bonds Slides (2016). *Climate Bonds Initiative* [PowerPoint slides]. Retrieved November, 10 2016 from email correspondence with Bridget Boule, Head of Market Analysis, Climate Bonds Initiative.

Real Estate Taxes References

Annual Report 2015. (2015). *Nantucket Islands Land Bank Web site*. Retrieved from <http://www.nantucketlandbank.org/Documents/AnnualReport2015.pdf>

CPA: An Overview. (2016). *Community Preservation Coalition Web site*. Retrieved from <http://www.communitypreservation.org/content/cpa-overview>

- How the Land Bank Works. (2016). *Nantucket Islands Land Bank Web site*. Retrieved from <http://www.nantucketlandbank.org/AboutHow.php>
- CPA Revenue Summary by Municipality. (2016). *Community Preservation Coalition* [Microsoft Excel file]. Retrieved July, 22 2016 from email correspondence with Chase Mack, Communications Director, of the Community Preservation Coalition.
- Martha's Vineyard Land Bank Home Page. (n.d.). *Martha's Vineyard Land Bank Commission Web site*. Retrieved from <http://www.mvlandbank.com/>
- Quarterly Newsletter Winter 2015. (2015). *Nantucket Islands Land Bank Web site*. Retrieved from <http://www.nantucketlandbank.org/Documents/PaperVersion2-2016.pdf>
- Quick Facts. (2016). *United States Census Bureau Web site*. Retrieved from <http://www.census.gov/quickfacts/table/PST045215/33,25,09,23,44,50>
- Total population for the state, counties, cities and towns, from the Decennial Census and Census Estimates, 1930–2014 (2014). *MassBenchmarks Web site*. Retrieved from <http://www.massbenchmarks.org/statedata/data.htm>
- Zieper, M. (2010). The Massachusetts Community Preservation Act A Case Study in Fostering Intergovernmental Partnership in Conservation Finance. In J. L. Levitt (Ed.), *Conservation Capital in the Americas Exemplary Conservation Finance Initiatives* (pp. 29-48). Cambridge, MA: Lincoln Institute of Land Policy.

Sales Taxes for Conservation References

- About the Funds. (2016). *Minnesota Legislative Coordinating Commission Web site*. Retrieved from <http://www.legacy.leg.mn/about-funds>
- Buchanan, M. (2016). *Public Conservation Funding in New England Recent Trends on Government Spending in New England*. Retrieved from <http://www.wildlandsandwoodlands.org/sites/default/files/Public%20Funding%20LR.pdf>
- Conservation Sales Tax. (2016). *Congressional Sportsmen's Foundation Web site*. Retrieved from <http://sportsmenslink.org/policies/state/conservation-sales-tax>
- Conservation Sales Tax: A Little Help from Nature's Friends. (2016). *Arkansas Game and Fish Commission Web site*. Retrieved from http://www.agfc.com/aboutagfc/Documents/consvtax_tenyr_report.pdf

- DNR Legacy Funded Projects. (2016). *Minnesota Department of Natural Resources Web site*. Retrieved from <http://dnr.state.mn.us/legacy/index.html>
- Lee, C., Pome, E., Beleacov, M., Pyon, D., Park, M. (2015, April 16). State Government Tax Collections Summary Report: 2014 Economy-Wide Statistics Brief Public Sector. Retrieved from <http://www2.census.gov/govs/statetax/G14-STC-Final.pdf>
- Quick Facts. (2016). *United States Census Bureau Web site*. Retrieved from <http://www.census.gov/quickfacts/table/PST045215/33,25,09,23,44,50>
- Sales Tax Rates by State. (2016). *Sales Tax Institute Web site*. Retrieved from <http://www.salestaxinstitute.com/resources/rates>
- Schlinkmann, M. (2016, May 9). *Nixon Puts Sales Tax Extension for Parks, Conservation on November Ballot*. Retrieved from http://www.stltoday.com/news/local/govt-and-politics/nixon-puts-sales-tax-extension-for-parks-conservation-on-november/article_7f2cd769-cc5e-5629-997a-669b20841f88.html.

Corporate Sustainability References

- Acres for America. (2016). *National Fish and Wildlife Foundation Web Site*. Retrieved July 15, 2016 from <http://www.nfwf.org/acresforamerica/Pages/home.aspx>
- Apple and The Conservation Fund advance forest protection efforts. (2016, November). *Apple Web site*. <http://www.apple.com/newsroom/2016/11/apple-and-the-conservation-fund-advance-forest-protection-efforts.html>
- Chapter 7, Grow More Wood. (2014). *New England Forests: The Path to Sustainability*. Retrieved from http://newenglandforestry.org/wp-content/uploads/2016/04/7._Grow_More_Wood_061214-SMALL.pdf
- Environmental Responsibility Report 2015 Progress Report, Covering FY 2014. (2015). *Apple Web site*. Retrieved from http://images.apple.com/environment/pdf/Apple_Environmental_Responsibility_Report_2015.pdf
- Environmental Responsibility Report 2016 Progress Report, Covering Fiscal Year 2015. (2016). *Apple Web site*. Retrieved from https://www.apple.com/environment/pdf/Apple_Environmental_Responsibility_Report_2016.pdf

FLASH REPORT: Eighty One Percent (81%) of the S&P 500 Index Companies Published Corporate Sustainability Reports in 2015. (2016). *Government and Accountability Institute, Inc. Web Site*. Retrieved from <http://www.ga-institute.com/nc/issue-master-system/news-details/article/flash-report-eighty-one-percent-81-of-the-sp-500-index-companies-published-corporate-sustainabi.html>

New York Declaration on Forests Action Statements and Action Plans. (2014). *United Nations Web site*. Retrieved from <http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf>

Reed Forest. (2016). *The Conservation Fund Web site*. Retrieved from <http://www.conservationfund.org/projects/reed-forest>

Sunrise Easement and St. Croix Corridor. (2016). *Downeast Lakes Land Trust Web site*. Retrieved from <https://www.downeastlakes.org/conservation/conservation-successes/sunrise-easement-saint-croix-corridor/>

Sustainable Living Brands Leading Unilever Growth (2016). *Unilever Web Site*. Retrieved from <https://www.unilever.com/sustainable-living/sustainable-living-news/news/sustainable-living-brands-leading-unilever-growth.html>

The Nature Conservancy and TD Bank Collaborate to Protect Important Forest Habitat. (2015, October). *The Nature Conservancy Web site*. Retrieved from <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/maine/newsroom/bradley-sunkhaze-press-release.xml>

Water Quality Trading Programs References

A Water Quality Trading How To Manual (2013, September). *Wisconsin Department of Natural Resources Web site*. Retrieved from http://dnr.wi.gov/topic/surfacewater/documents/wqt_howto_9_9_2013signed.pdf

Gartner, T., J. Mulligan, R. Schmidt, J. Gunn. (2013 October). Natural Infrastructure: Investing Forested Landscapes for Source Water Protection in the United States. World Resources Institute. Retrieved from <http://www.wri.org/publication/natural-infrastructure>

Implementing Clean Water Act Section 303(d): Impaired Waters and Total Maximum Daily Loads (TMDLs). (2016). *US Environmental Protection Agency Web site*. Retrieved from <https://www.epa.gov/tmdl>

Medford Water Quality Trading Program. (2016). *The Freshwater Trust Web site*. Retrieved from <http://www.thefreshwatertrust.org/case-study/medford-water-quality-trading-program/>

National Summary of State Information (2015). *U.S. Environmental Protection Agency Web site*. Retrieved from https://ofmpub.epa.gov/waters10/attains_nation_cy.control#wqs.

Report of the Nitrogen Credit Advisory Board for Calendar Years 2014 and 2015 to the Joint Standing Environment Committee of the General Assembly (2016 September). *Connecticut Department of Energy and Environmental Protection Web site*. Retrieved from http://www.ct.gov/deep/lib/deep/water/lis_water_quality/nitrogen_control_program/nitrogen_report_2014_2015.pdf

Selman, M., Greenhalgh, S., Branosky, E., Jones, C., Guiling, J. (2009 March). *Water Quality Trading Programs: An International Overview*. Retrieved from http://www.wri.org/sites/default/files/pdf/water_trading_quality_programs_international_

Water Quality Assessment Categories (2015 March). *Department of Ecology State of Washington Web site*. Retrieved from <http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html>

Compensatory Mitigation References

Available Forest Conservation Banks (2016 February). *Montgomery County Planning Department Web site*. Retrieved from http://www.montgomeryplanning.org/environment/forest_conservation_banks/documents/Available_Forest_Conservation_BANKS_2015_November.pdf

Banking on Conservation: Species and Wetland Mitigation Banking - Ecosystem Marketplace. (2016). *Ecosystem Marketplace Web site*. Retrieved from <http://www.ecosystemmarketplace.com/publications/banking-on-conservation-species-and-wetland-mitigation-banking/>

Chapter 22A Forest Conservation Law. (2014). *Montgomery County Planning Department Web site*. Retrieved from <http://www.montgomeryplanning.org/environment/forest/documents/ForestConservationLaw2014.pdf>

De Jesús Santana, E. (2015). Forest Conservation Banks Montgomery County, MD in 2015 [Map]. Retrieved from personal correspondence with Katherine Nelson, Area 3 Planner Coordinator, Montgomery County (2016, December 5).

Governor O'Malley Signs Landmark Forest Legislation (2013). *Maryland Department of Natural Resources Web site*. Retrieved from <http://news.maryland.gov/dnr/2013/05/02/governor-omalley-signs-landmark-forest-legislation/>

Guidelines for Preparing a Compensatory Mitigation Plan (2010). *United States Army Core of Engineers Web site*. Retrieved from http://www.sac.usace.army.mil/Portals/43/docs/regulatory/Guidelines_for_Preparing_a_Compensatory_Mitigation_Planf.pdf

Ecosystem Services Markets for MD Forestland. (2016). *Forests for the Bay Web site*. Retrieved from https://www.forestsforthebay.org/ecosystem_services_markets.cfm?sid=MD

Ecosystem Services Working Group Final Report (2011, October). *The Conservation Fund Web site*. Retrieved from http://www.conservationfund.org/images/cln_events-resources/2015_WQM_Workshop/WQM-Resources/2_Regional_Outlook/Chesapeake_Bay_Region/7_-_ESWGFinalReportOct2011.pdf

For Landowners | Conservation Banking. (2016, June 3). U.S. Fish and Wildlife Service Endangered Species Website. Retrieved from <https://www.fws.gov/endangered/landowners/conservation-banking.html>

Forest Conservation Act, Md. NATURAL RESOURCES Code Ann. § 5-1602 (1991).

Forest Conservation Worksheet (2016). MD-TREE 1 [Excel document]. Retrieved from personal correspondence with Katherine Nelson, Area 3 Planner Coordinator, Montgomery County (2016, December 12).

Forest Conservation Banks. (2013, May). *Montgomery County Planning Department Web site*. http://www.montgomeryplanning.org/environment/forest_conservation_banks//index.shtm

Natural Resources – Forest Preservation Act of 2013, House Bill 706 (2013). *General Assembly of Maryland Web site*. Retrieved from <http://mgaleg.maryland.gov/2013RS/bills/hb/hb0706T.pdf>

Nelson, K., Reynolds, K. (2016 March). *Forest Conservation Program Annual Report for FY 2015*. Retrieved from http://www.montgomeryplanningboard.org/agenda/2016/documents/ForestConservationPlanAnnualReportFY2015_000.pdf

- No-Net-Loss of Forest Policy Recommendations to the Maryland Department of Natural Resources (2012). *Maryland Department of Natural Resources Web site* [PowerPoint slides]. Retrieved from http://dnr.maryland.gov/forests/Documents/sfc/SFC_NNL_110811.pdf
- Oloffson, P., Holden, C., Bullock, E., Woodcock, C. (2016). Time series analysis of satellite data reveals continuous deforestation of New England since the 1980s. Retrieved from <http://iopscience.iop.org/article/10.1088/1748-9326/11/6/064002/pdf>
- Regulatory In-Lieu Fee and Banking Information Tracking System. (2016, October). *United States Army Core of Engineers Web site*. Retrieved from https://ribits.usace.army.mil/ribits_apex/f?p=107:2
- Report on Policies to Achieve No Net Loss of Forests in Maryland. (2011, December). *Maryland Department of Natural Resources Web site*. Retrieved from <http://dnr.maryland.gov/forests/Documents/nonetlossfinalreport.pdf>
- The Status of Wetland Mitigation Banking. (2002). *Banks and Fees – The Status of Off-site Wetland Mitigation in New England* (pp. 38). Washington, D.C.: Environmental Law Institute.
- Thompson, J., Plisinski, J., Morreale, L., Blumstein, M., Duveneck, M., Hall, B., Rodríguez-Gonzalez, M. (2016). *Recent Land Use Trends in New England, Scenarios, Harvard Forest* [PowerPoint slides]. Retrieved from https://s3rcn.files.wordpress.com/2016/01/rt_slides_all_states.pdf



Highstead

127 Lonetown Road, Redding CT 06896

www.Highstead.net