



Payments for Forest Carbon

***Opportunities
& Challenges
for
Small Forest Owners***

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A photograph of two young children walking away from the camera on a path covered in fallen autumn leaves. The child on the left is a girl with long brown hair, wearing a pink jacket and blue pants, carrying a grey and orange backpack. The child on the right is a boy with blonde hair, wearing a red and navy blue jacket and blue pants. They are walking through a forest with many birch trees and trees with yellow and orange autumn foliage. The scene is softly lit, suggesting a sunny day.

“The future of carbon sequestration payments is full of uncertainty, and yet there is a potential for small forest owners to benefit from this new revenue source.”

Executive Summary

Small landowners in the Northern Forest face a number of challenges in maintaining their forests as forests. High land prices, transition in the wood products industry and a tight economy create pressure for forests to be sold and developed. Payments for forest carbon sequestration are an emerging opportunity for small forest owners to earn additional income, and in turn to sustain both the economic and ecological values of the Northern Forest. This report explains how payments for forest carbon sequestration occur, how small forest owners can participate, and the benefits and drawbacks of doing so.

Climate change is one of the greatest challenges facing the world, and forests have the ability to be part of the solution to mitigating and adapting to it. U.S. forests presently sequester 10 percent of all annual domestic carbon emissions and the U.S. Environmental Protection Agency estimates that number could be doubled to 20 percent if forest owners were more engaged in carbon sequestration activities.^{1,2} Increasingly, there are incentives for such engagement. Carbon markets have exploded in the past several years, the trade in carbon offsets alone doubling between 2006 and 2007, and again between 2007 and 2008 to a total of \$705 million.³ The worldwide market in carbon already tops \$64 billion.⁴ And now, additional government programs that would provide technical and financial assistance to small forest owners for carbon projects are being discussed by Congress. The opportunity for small forest owners to benefit is present and growing.

At the same time, there are challenges that make



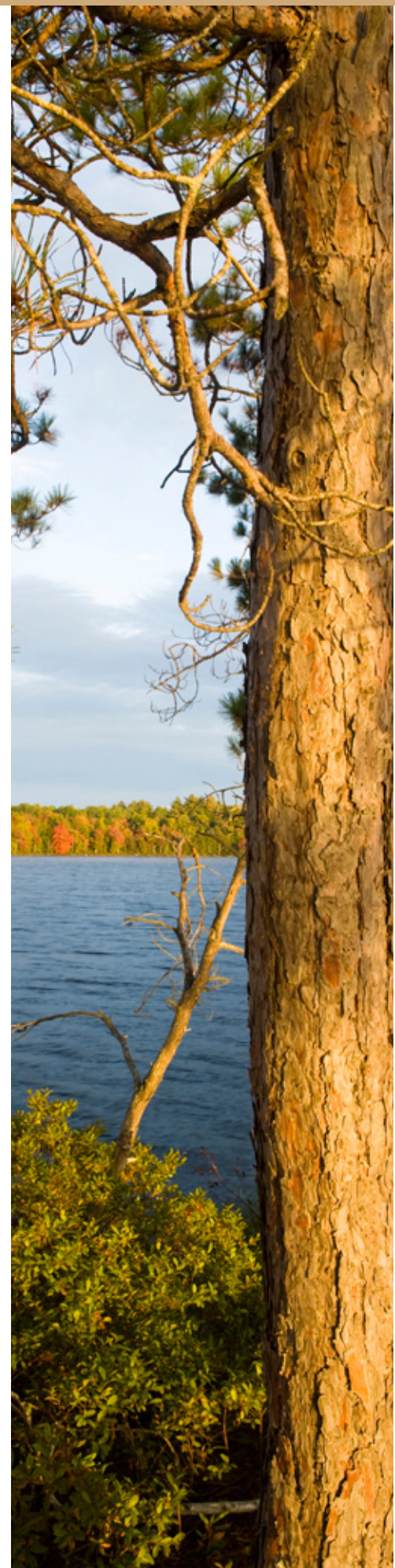
participation in forest carbon projects difficult and uncertain. Such projects can be complex and costly to develop, while at the same time the financial return fluctuates with market prices. Government programs, which would provide a more certain financial return, have not yet been created. And a cap-and-trade bill being debated by Congress in the fall of 2009 would change the rules and criteria for carbon projects and markets. The future of carbon sequestration payments is full of uncertainty, and yet there is a potential for small forest owners to benefit from this new revenue source. By understanding how forest carbon payments work presently, small forest owners will be better positioned to take advantage of future opportunities.

This report is intended as a resource for landowners, non-profits, and government agencies seeking to understand both the opportunities and challenges presented by forest carbon sequestration projects. It covers basic background on the carbon markets and offset standards, discusses the process of developing a forest offset project and the associated costs, delves into regulatory uncertainty and potential government programs and briefly examines the potential for payments for other ecosystem services. While every forest carbon project is different, this primer attempts to provide a general, understandable, and comprehensive set of information for small forest owners who are just beginning to learn about forest carbon projects and payments. A glossary of common terms is provided on page 43 and list of acronyms on page 7.



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Abbreviations

ACES	The American Clean Energy and Security Act of 2009
ATFS	American Tree Farm System
CAR	Climate Action Reserve
CCX	Chicago Climate Exchange
CO ₂ e	Carbon dioxide equivalent
EQIP	Environmental Quality Incentive Program
EPA	Environmental Protection Agency
EU ETS	European Union Emissions Trading Scheme
FSC	Forest Stewardship Council
GHG	Greenhouse gas
MACED	Mountain Association for Community Economic Development
NCOC	National Carbon Offset Coalition
OESM	Office of Ecosystem Services and Markets
OTC	Over-the counter
PDD	Project Design Document
RGGI	Regional Greenhouse Gas Initiative
SEI	Sustainable Economy Initiative
SFI	Sustainable Forest Initiative
TNC	The Nature Conservancy
USDA	U.S. Department of Agriculture
VCS	Voluntary Carbon Standard

Introduction

The traditional forest products economy of the Northern Forest region is in transition. In this context, Northern Forest landowners, many in the forest products industry, as well as government and non-profit groups are working to identify the forest value streams that could help to re-establish and sustain economic value in the region's forested landscapes when coupled with traditional timber markets. In 2008, the Northern Forest Sustainable Economy Initiative (SEI) presented a regional framework for economic revitalization in the region, and later that year the U.S. Endowment for Forestry & Communities selected the Northern Forest as one of three forest investment zones in the U.S., providing resources to implement portions of the SEI strategy.



SEI's recommendations include securing a place for the Northern Forest in carbon markets and programs, as well as exploring the potential for payments for other ecosystem services. Such payments could become a new economic opportunity for forest landowners and help to maintain working forestland in the region.

As partners in the Northern Forest Investment Zone, Coastal Enterprises, Inc., the Manomet Center for Conservation Sciences, and the Northern Forest Center are examining how emerging markets for forest ecosystem services – with an initial focus on carbon sequestration in managed forests – might provide new revenue for forest landowners and communities. Small landowners are largely un-engaged in programs and markets that provide payments for carbon sequestration, and most are not yet aware of the growing potential for payments for other ecosystem services. This report represents an important step in changing that dynamic by examining the opportunities and challenges that small forest owners face in engaging in forest carbon sequestration projects.

Maintaining Forests as Forests: The Potential of Carbon Sequestration Payments

Private forestlands dominate the landscape of the northeastern U.S.*, providing economic activity, recreational opportunities, open space, clean water, and wildlife habitat. People in the region value these services and yet they are increasingly threatened. Forests face development pressure, invasive species, and the imminent transfer of forestland to a new generation of owners.⁵ Small forest owners (who own 55% of forestland in the northeast, generally in blocks of less than 1,000 acres) are faced with great difficulty in maintaining forestland in the face of such pressures.⁶ Generating a reliable income from forestlands helps many small forest landowners to keep forests as forests, but traditional sources of forest revenue have declined in recent years.

* The definition of northeastern used throughout this document is the USDA Forest Service's Northeastern Area for State and Private Forestry, comprised of 20 Northeastern and Midwestern states.

What is Carbon Sequestration?

Carbon sequestration occurs when carbon is captured and securely stored, normally in vegetation, soil or rock.

Why is Carbon Sequestration Necessary?

Carbon sequestration is necessary because it is one way to reduce atmospheric carbon, which causes climate change. Climate change is already effecting precipitation and temperature patterns around the world, causing droughts, raising sea levels and increasing the strength and frequency of storms.

How Can Small Forest Owners Sequester Carbon?

Forests, which take carbon out of the atmosphere and sequester it in woody biomass and soil, have a critical role to play in slowing and reducing the impacts of climate change. U.S. forests presently sequester 10 percent of all domestic carbon emissions annually but the U.S. Environmental Protection Agency estimates that this could be doubled to 20 percent.^{10, 11} Forest carbon sequestration projects (a.k.a forest offsets), including activities such as reforestation, afforestation, avoided deforestation, or active forest management, can all help to sequester additional carbon.

Forest carbon sequestration projects may have the potential to provide a new income stream to small forest owners. U.S. trade in carbon offsets doubled between 2006 and 2007, and again between 2007 and 2008 to a total of \$705 million.⁷ The worldwide market in carbon already tops \$64 billion.⁸ In New England, forests annually sequester an estimated 12 to 20 percent of current regional carbon emissions from the atmosphere.⁹ Connecting Northern Forest owners to programs and markets that provide payments for carbon sequestration could result in new revenue for landowners and better environmental stewardship of the region's forests. This report examines both the opportunities and challenges small landowners face in engaging in forest carbon sequestration projects.

There are two commonly discussed ways in which forest carbon sequestration payments might be made:

- The sale of forest carbon offsets on the carbon markets ("market-based payments").
- Direct payments to landowners through government programs ("program-based payments").

There are advantages and disadvantages to both market and program-based payments. Carbon markets already exist and forest offset projects have been sold, but accessing such markets can be complex and profits depend on an ever fluctuating market price. Alternatively, government programs have only begun to be discussed but, if established, may be simpler to access and provide a more reliable income for small forest owners. Uncertainty over what the future holds is high, yet most agree that there is a growing opportunity for forest owners to benefit from forest carbon revenue.

This paper serves as a primer for small forest owners, non-profits and government agencies on the present state of both market and program-based carbon sequestration mechanisms. It describes how forest carbon offset projects are developed and brought to market, and how demand for such projects may change in the near future. It also explores how existing government programs might be expanded to incorporate technical and financial assistance for carbon sequestration. While the future is uncertain, understanding the opportunities and challenges small forest owners face in engaging in forest carbon projects is an important step forward.



Market-Based Payments for Carbon Sequestration

Market-based payments for forest offsets are already occurring. Carbon is currently traded in multiple markets around the world, sometimes voluntarily (the voluntary market) and sometimes because of government regulation (a compliance market). Each carbon market uses different carbon offset standards to govern forest projects, and has a different market price for carbon. This section begins with a basic overview of voluntary and compliance carbon markets, and then walks through the logistics of how a small forest owner could develop a forest offset project. The financial opportunities and challenges are discussed, along with regulatory uncertainty surrounding carbon markets, and the potential for other market-based payments in the future.

Most forest carbon offsets are presently traded in the voluntary carbon market

Transactions on the domestic voluntary market fall into one of two categories: those that occur on the Chicago Climate Exchange (CCX), and those that are direct, over-the-counter (OTC) transactions. The CCX is a membership-based voluntary market in which members commit to a certain level of carbon emission reduction which they are then bound to by law. All categories of forest offset projects are accepted by the CCX, which uses its own carbon offset standard in establishing and monitoring forest offsets. Forest projects accounted for 22% of registered offsets on the CCX in 2008. OTC transactions are voluntary trades directly between a buyer and seller. In 2008, OTC carbon averaged a 66% higher price than CCX carbon.¹² OTC offset projects may be governed by any one of a variety of carbon offset standards. In 2008, 11% of OTC transactions involved forest offsets.¹³

What is a Forest Offset?

Carbon offsets are created by projects that reduce greenhouse gas (GHG) emissions, and may include activities ranging from capturing landfill methane to renewable energy projects. Within the forest offset category, activities to reduce GHG emissions include:

Afforestation: Carbon sequestration through the creation of forests on land that was previously unforested, typically for longer than a generation.

Reforestation: Carbon sequestration through restoration of forests on land that was once forested.

Active forest management: Carbon sequestration through particular forest management practices. If a forest is being harvested, wood products may provide sequestration value.

Reduced Emissions from Deforestation and Degradation (REDD): Avoided carbon emissions via conservation of existing carbon stocks (i.e. avoided deforestation).

Compliance markets have historically been more restrictive of forest offsets

Compliance markets are created when a government enacts carbon emissions reduction legislation. This commonly takes the form of a cap-and trade program, where a total cap on emissions is set and participants (usually countries, regions, or industries) are allocated carbon allowances based on an emission reduction target. Participants can trade these allowances or purchase carbon credits, which are generated by carbon offset projects, to cover additional emissions that they can't meet with allowances. There are an increasing number of compliance markets around the globe, and the U.S. Congress is debating whether to initiate a domestic compliance market (discussed further on page 22).

Compliance markets have historically limited forest offset projects more strictly than the voluntary market. This is primarily because forest carbon can be difficult to measure and maintain (forest carbon accounting challenges are discussed further on page 20). The European Union Emissions Trading Scheme (EU ETS) has gone as far as not allowing any forest offsets to be traded. Appendix A describes each of the major carbon markets around the world and the types of forest offset projects they accept.

In the northeast, the Regional Greenhouse Gas Initiative (RGGI) is the first compliance market in the U.S., and has initially accepted only afforestation projects. A rule change anticipated in 2010 may expand RGGI forest offsets to include managed forest, avoided deforestation, and urban and community forestry projects. If the U.S. Congress passes a domestic climate change bill, the RGGI market would be incorporated into this larger U.S. compliance market.

What is a Carbon Offset Standard?

Carbon offset standards are sets of criteria and rules that certify the quality of a carbon offset project. Standards dictate how carbon is measured and monitored, the length of time for which the offset must be maintained, and many other project details. Compliance markets each have their own standard, developed by the regulating body. Likewise, the CCX uses its own standard. Multiple offset standards exist and are used in OTC transactions. There are approximately 17 different standards available, and in 2008 the most utilized standards by transaction volume were the Voluntary Carbon Standard (VCS, 48%), the Gold Standard (12%), the Climate Action Reserve (CAR, 10%), and the American Carbon Registry Standard (9%).¹⁴

* Hamilton, Katherine, Allison Shapiro, and Thomas Marcello. 2009. *Fortifying the Foundation: State of the Voluntary Carbon Markets, 2009*. Ecosystem Marketplace and New Carbon Finance.

Carbon Aggregation

Small forest owners are generally unable to sequester enough carbon on an annual basis to create a carbon offset on their own. This is because carbon is typically traded in 100 metric tons of CO₂ equivalents (CO₂e), while northeastern U.S. forests are estimated to sequester approximately 0.6 to 6 metric tons of CO₂ per acre annually.^{15, 16} Landowners with holdings too small to sequester a large volume of carbon on their own can participate in a process known as carbon aggregation. Carbon aggregation combines the carbon sequestered by multiple landowners into one common pool for the purpose of market interactions.

Carbon aggregators are organizations that help small landowners develop projects and undertake the carbon pooling and marketing process. Aggregators come in a variety of forms, including both for-profit and non-profit business models. This new field has seen a large amount of growth in just the last year. As of June 2009, there were 92 offset aggregators registered on the CCX, up from 59 registered aggregators in March of 2008.^{17, 18} While many of these aggregators are focused internationally and on non-forestry offsets, a growing number are dealing in domestic forest offsets.

In addition to carbon aggregators, a new layer of sub-aggregator organizations began to form in 2008. Sub-aggregators normally have an existing relationship with a set of forest owners and are well positioned to work with them in creating a carbon pool. Sub-aggregators typically manage the initial outreach to landowners and most parts of project development and pooling, and then turn carbon pools over to aggregators for marketing and sales.

One-page profiles of five carbon aggregators and four sub-aggregators that are actively engaging in forest carbon aggregation projects with small, non-industrial forestlands can be found in Appendix B, page 33. An example is provided on the following page; the Mountain Association for Community Economic Development is a partner in the Appalachian Forest Investment Zone, a sister initiative to the Northern Forest Investment Zone. While not inclusive of all forest carbon aggregators, the organizations profiled represent a variety of business models. Some of these aggregators have grown out of older forestry consulting firms and offer carbon aggregation as one of a suite of services. Others are start-ups focused specifically on forest carbon aggregation. A number of the companies profiled provide some form of financial assistance to landowners to cover up-front costs of project development. Most are focused on specific geographic regions and a few are using forest carbon as a means for engaging landowners in broader conservation efforts.

Aggregator Profiles

The Delta Institute
Forecon Ecomarket Solutions
Forest Opportunities Initiative
National Carbon Offset Coalition
Northwest Neutral

Sub-Aggregator Profiles

CarbonTree
Red Rocks
Woodlands Carbon Inc.
Working Woodlands

Forest Opportunities Initiative, MACED

Organization Background: The Mountain Association for Community Economic Development (MACED) was established in 1976 by ten Community Development Organizations in Central Appalachia. MACED's mission is to improve life in mountain towns through community and business development.

Carbon Aggregation History: The Forest Opportunities Initiative promotes sustainable forest management through education, financial planning & loans, and technical assistance. Carbon aggregation services were incorporated into the program in 2008, when MACED became a registered carbon aggregator on the CCX.



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Sub-Aggregators: MACED does not work with sub-aggregators at this time.

Geographic & Landowner Focus: The program works with non-industrial forests of all sizes in the Appalachian region of Kentucky, Ohio, Tennessee, Virginia, and West Virginia.

Carbon Offset Standards: The forest offset protocol followed by the program was developed in-house and can be modified to meet CCX, VCS, or CAR requirements. Initially the program has focused on marketing carbon pools on the CCX but will pursue OTC transactions in the future.

Carbon Sales: As of July 2009 MACED has a carbon pool with 31 landowners and 16,000 acres in 2 states registered on the CCX but has not yet made a sale. Additional carbon projects are under development.

Sustainable Forest Certification: Both FSC, SFI and ATFS certifications are accepted by the program but most landowners in the central Appalachian region have ATFS certification.

Outreach: Outreach to landowners began with presentations at landowner meetings (mostly coordinated through NRCS extension offices), radio interviews, and advertisements in newspapers.

Financial Assistance: A revolving loan fund at a 5% annual interest rate is available to landowners to cover up-front expenses. Payment is deducted from the revenue generated from the sale of the carbon credits.

Fees: Like most aggregators, MACED deducts the \$0.20 cent per ton trading fee collected by the CCX from the gross revenue of each project and charges a 10% fee for its services.

Funding Sources: Additional funding for the program comes from foundations including the U.S. Endowment for Forestry and Communities, the Blue Moon Fund, and the Ford Foundation.

Staff: The program employs 3 staff members, all of which are focused on forest carbon aggregation.

Bringing a forest offset project to market involves multiple steps and a variety of skills

Developing a forest offset project requires targeted forest management along with the measuring and monitoring of carbon assets, data management, accounting, market analysis, and deal brokerage. The exact process varies depending on the specific project and offset standard, but a general outline of the steps and participants involved is included below.

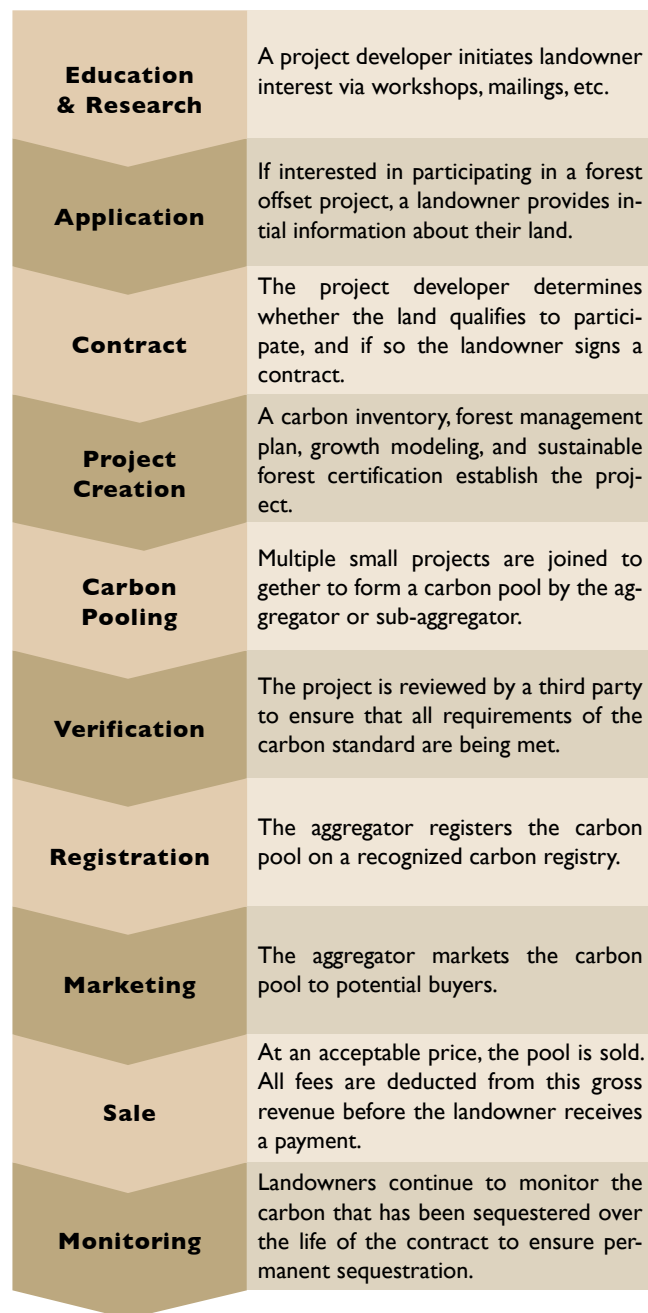
Project Initiation

Small forest offset projects are generally initiated by a sub-aggregator or aggregator, who market their carbon aggregation programs through landowner meetings and workshops, websites, or direct mailings. If a landowner is interested in participating in a project, they submit an application with basic information about the forest and proof of ownership. Accepted applicants are offered a contract to complete the carbon offset project. This contract requires forest owners to follow the aggregator's specific program terms and the rules of the standard that will be applied to the project. Contract lengths vary from 15 years to 100 years depending on the standard.

Project Development

Project development requires the help of a professional forester and involves documentation of forest carbon characteristics and forest management in a Project Design Document (PDD). The exact requirements of project development vary widely by standard. The PDD includes information from:

1. A *carbon inventory* that measures the amount of carbon presently sequestered in different parts of the forest. This acts as a baseline against which future carbon sequestration is measured.
2. A *forest management plan* that provides guidelines for current and future forest management.
3. A *sustainable forest certification*, normally obtained from the ATFS, FSC, or SFI.



4. *Growth and yield modeling*, which helps to determine the total carbon value of the land.

Carbon Pooling

Once the PDD is complete, the sub-aggregator or aggregator uses a data management system to organize multiple small offset projects into a larger carbon pool. In this context, a carbon pool refers to an electronic combination of the carbon sequestration potential from multiple small projects. Carbon pools are created in order to generate offsets that are large enough for market transactions. A forest carbon pool typically includes the carbon sequestration generated by at least 10,000 acres of forestland. Pooled projects typically share common characteristics such as geographic proximity.

Verification and Registration

An independent third-party verifier confirms the information in the PDD to ensure compliance with carbon accounting standards. The carbon pool is then registered, either through the marketplace where it will be sold or, in the case of OTC sales, on a carbon registry that tracks the ownership of the carbon pool through all market interactions. Offsets increasingly pass through multiple owners (due to market speculation) before they are used to offset emissions and thus retired. Registries help to prevent fraud by making sure that an offset is only retired once.

Marketing and Sales

Marketing and transaction decisions are handled by the carbon aggregator or a broker on behalf of the entire carbon pool. Landowners are paid when a sale is made and after all fees and loans have been deducted from the gross revenue. Because forest offset projects sequester new carbon each year, carbon sales for a single project may take place as frequently as every year, for the duration of the contract. Thus, a forest offset can provide an annual revenue stream for small forest owners. However, if carbon prices are low, an aggregator can also choose to wait to sell that year's carbon.

Monitoring and Auditing

After the sale of the offset, the forest owner must continue to monitor their forest and ensure that carbon remains sequestered for the duration of the contract. Monitoring reports are required on an annual or semi-annual basis depending on the standard and occasional carbon audits by a third-party double-check these reports.

Developing a forest carbon offset can be expensive

Landowners are often, though not always, expected to pay for the up-front expenses in the project development phase including the carbon inventory, management plan, and sustainable forest certification. In addition, the sub-aggregator, aggregator, and broker each are paid a commission from the gross revenue of the sale. Total project costs vary widely based on the size of the project, whether the forest owner has previously completed a forest management plan and sustainable forest certification, and the requirements of the project's offset standard. Table I contains a list of expenses typically associated with a forest offset project.

Some sub-aggregators and aggregators offer financial assistance to small landowners to cover up-front project development expenses. This is either in the form of a low-interest loan that is repaid through the revenue from carbon sales, or outright subsidization of expenses, usually funded through a philanthropic grant. It is also possible, though difficult, to find external investors in forest offset projects. Alternatively, buyers looking for specific project attributes (i.e. location, co-benefits such as conservation of wildlife habitat) may pre-finance a project.

In general, larger projects tend to cost less on a per-acre basis because some costs are fixed. This means that larger projects are able to break even at lower carbon prices and thus carry less financial risk for the landowner. At \$1.50 per ton (the CCX price in June 2009) most carbon aggregators estimated that at least 200 acres per landowner would be necessary for a forest offset project to be profitable. Clearly a solid financial analysis should be conducted before a landowner signs a contract and the project is begun. The USDA Forest Service has developed a useful financial tool, CVal,¹ for calculating the breakeven price for forest carbon offset projects.



¹ CVal can be downloaded for free at: http://www.fpl.fs.fed.us/products/publications/specific_pub.php?posting_id=14478&header_id=p

Table I
Forest Offset Costs

COST	DESCRIPTION
Opportunity Costs	Foregone profits from harvests (through higher retention, longer rotations, etc.) or development.
Forest Carbon Inventory	Characterizes the pools of carbon in a forest, measures key carbon fluxes, and collects related data necessary to drive growth and yield models.
Forest Management Plan	Describes the objectives and prescribed management actions for the forest area, including a plan to measure and monitor carbon with quality.
Growth & Yield Modeling	Helps to value the carbon in the project through the manipulation of inventory data and the forest management plan.
Sustainable Forest Certification	A third-party certification that the forest is being sustainably managed. Most commonly obtained from the ATFS, FSC, or SFI.
Verification Fee	A third-party verification of information contained in the PDD is required.
Registration Fee	Most carbon offset standards have registries, which track the carbon pool through various transactions (re-sale of carbon offset projects is increasingly common) until it is retired, helping to prevent fraud.
Sales Fee	The CCX trading platform charges \$0.20 cents per ton trading fee on all transactions. Carbon brokers also charge varying sales fees.
Sub-aggregator Fee	The sub-aggregator fee covers expenses such as education & outreach, application review, data management in the aggregation process and general project oversight.
Aggregator Fee	The aggregator fee covers expenses associated with project development as well as market knowledge and deal brokering actions.
Monitoring & Auditing	After the initial establishment of a carbon project, the landowner must keep their aggregator updated on changes in forest carbon stocks. Auditing is undertaken to ensure that the landowner is fulfilling their contract and that carbon is being sequestered at the estimated rate.

Project profitability depends on many factors

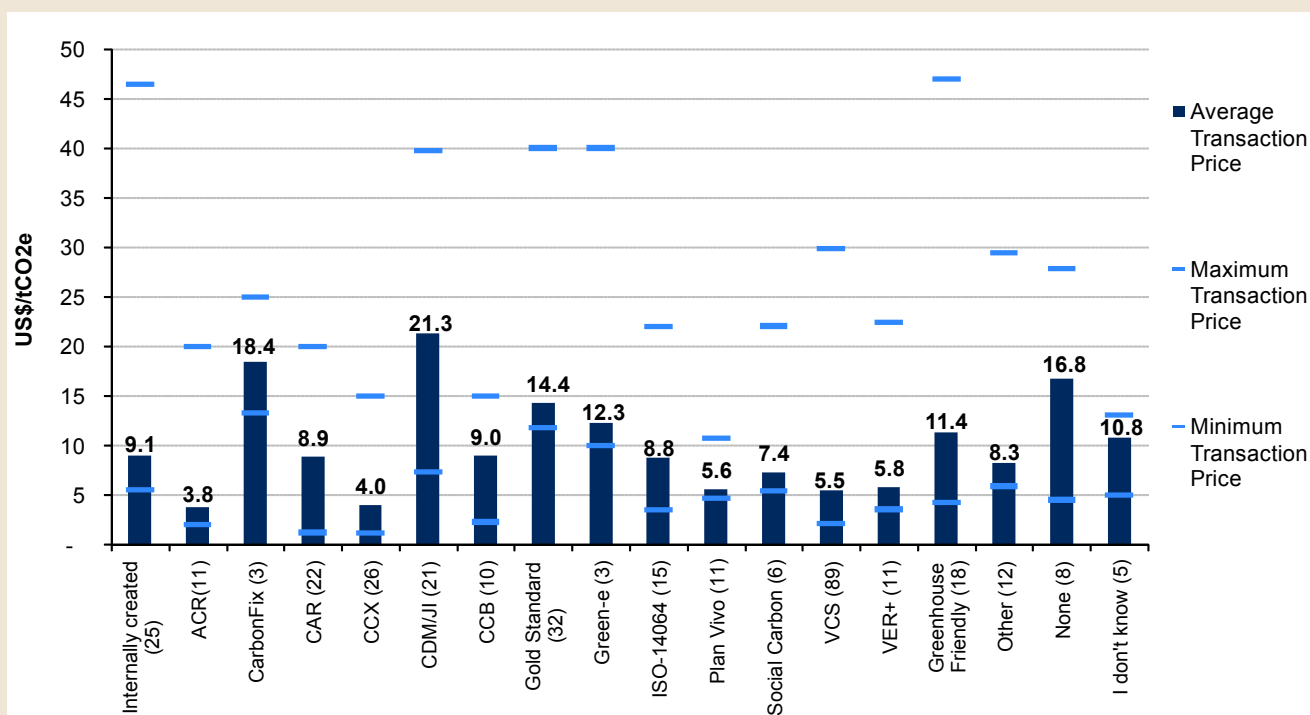
It is important to remember that like any investment, there is no guarantee that a forest owner will profit or even break even on a forest offset project. Carbon prices are not locked in and have fluctuated widely in the past few years. CCX prices reached a high of \$8 per ton CO₂e in 2008 but have since fallen to less than \$1 per ton in July of 2009.¹⁹ The price that an offset project will fetch also varies between markets and by the type of forest project and offset standard used (see Table 2 and Figure 1). Buyers may also be willing to pay more or less for an offset based on specific characteristics, such as project location or co-benefits such as poverty reduction and the conservation of biodiversity.²⁰

Table 2
Credit Price by Project Type, OTC 2008

PROJECT TYPE	AVERAGE PRICE/tCO ₂ e
Afforestation/Reforestation Plantation	\$6.4
Afforestation/Reforestation Conservation	\$7.5
Forest Management	\$7.7
Avoided Deforestation	\$6.3

Data Source: Ecosystem Marketplace, New Carbon Finance

Figure 1
Credit Prices and Price Ranges by Standard



Graphic Courtesy of Ecosystem Marketplace, New Carbon Finance

The “quality” of an offset standard can affect the price that a forest offset project receives

Each carbon offset standard applies unique rules to forest offset projects and deals with forest carbon accounting differently. Forest carbon accounting criteria include *additionality* of carbon sequestration, *permanence* of the project and the potential for carbon *leakage*. Standards that take a stricter approach to forest carbon accounting are considered to be of higher quality, and are thus worth more than standards that are less strict. Differences between standards can be particularly confusing but are critical to consider before a project is begun. Table 3 shows how four commonly used standards deal with the criteria of additionality, permanence, and leakage.

In general, standards that take a stricter line on additionality, permanence, and leakage require greater up-front costs but can also command higher prices once developed. For example, standards such as Climate Action Reserve (CAR) that require longer time commitments may sell at a higher price because of greater permanence, but also carry a higher opportunity cost for the landowner. Likewise, the double-blind verification required by the Voluntary Carbon Standard (VCS) brings greater certainty regarding the carbon baseline but may be cost prohibitive for small landowners. In contrast, the CCX, which accepts the widest array of forest carbon offsets and requires the shortest time commitment (15 years) commands lower prices. The average price of carbon on the CCX was 66% lower than the average price obtained through OTC transactions in 2008.²¹

Selecting the proper standard for a forest offset project depends on the risk-re-

Forest Carbon Accounting Challenges

Additionality refers to GHG removal that is in addition to what would have occurred in the absence of the project. For example, the normal growth of biomass in a forest protected by a conservation easement is not additional as it would have occurred anyway. Additionality can be difficult to demonstrate for forest carbon projects, and relies on establishing a carbon baseline against which the net change in carbon stocks can be quantified.

Permanence refers to the ability of a project to remove GHGs from the atmosphere for a significantly long time. This can become an issue in forest projects because of natural events such as hurricanes or wildfires releasing carbon, and also because of management activities such as harvesting. Mechanisms to ensure permanence include deed restrictions on land use and long-term or permanent conservation easements.

Leakage occurs when a project causes emissions to shift to other locations. For example, a forest offset project that restricts timber harvest in one location might decrease the supply of lumber on the market, causing producers elsewhere to harvest more timber. Leakage can be prevented within one landowner’s portfolio by requiring that all forestlands under that ownership be included in any reporting, however leakage external to that property can be very difficult, if not impossible, to measure.

Table 3

How Carbon Offset Standards Deal with Accounting Challenges

Chicago Climate Exchange (CCX)	Regional Greenhouse Gas Initiative (RGGI)	Climate Action Reserve (CAR)	Voluntary Carbon Standard (VCS)
<p>The CCX is a membership-based voluntary market established in 2003 in which members commit to a certain level of carbon emissions reduction which they are then bound to by law.</p> <p>Eligible forest offsets include:</p> <ul style="list-style-type: none"> • Afforestation • Managed Forest Projects • Long-lived Wood Products 	<p>RGGI is a compliance market in 10 Northeastern U.S. states established in 2005.</p> <p>Eligible forest offsets include:</p> <ul style="list-style-type: none"> • Afforestation[†] <p>New project rules for forest management, avoided deforestation, and urban and community forestry are under review and may be included in the future.</p>	<p>The CAR is a voluntary carbon offset standard that grew out of the California Climate Action Registry, a voluntary carbon market created by the state of California in 2001.</p> <p>Eligible forest offsets include:</p> <ul style="list-style-type: none"> • Improved Forest Management • Reforestation • Avoided Conversion 	<p>The VCS was established in 2005 and is the most commonly used voluntary carbon offset standard.</p> <p>Eligible forest offsets include:</p> <ul style="list-style-type: none"> • Afforestation, Reforestation & Re-vegetation • Improved Forest Management • Reduced Emissions from Deforestation and Degradation
Baseline & Additionality			
<p>Base-year measurements establish the baseline and annual carbon stock changes are reported.</p> <p>All managed forest projects are subject to approval of the CCX Committee on Forestry.</p> <p>A sustainable forest certification is required.</p>	<p>Base year measurements establish the baseline and carbon stock changes are reported not less than every 5 years.</p> <p>A sustainable forest certification is required.</p>	<p>To establish baseline onsite carbon stocks, the forest owner must model 100 years of carbon stock changes in each of the forest project's required and selected optional onsite carbon pools.</p> <p>A sustainable forest certification is required.</p>	<p>The previous 5-10 years of forest management is used as a baseline and projected through the life of the project. Changes in carbon due to new forest management practices are measured against this baseline.</p> <p>A sustainable forest certification is required.</p>
Permanence			
<p>A 15 year contract is required along with a letter of good faith stating that the land will be maintained in forest beyond the 15 year contract period.</p> <p>In order to account for a reversal[‡] 20% of carbon offset credits are placed into a reserve pool.</p>	<p>A permanent conservation easement is required.</p> <p>A project receives 90% of the net change in carbon and the remaining 10% protects against a reversal.</p>	<p>A 100 year commitment[§] is required along with annual monitoring and verification at least once every 6 years.</p> <p>The percent of credits set aside as a buffer in case of a reversal is based on a project-specific risk evaluation.</p>	<p>Commitments range in length from 20 to 100 years.</p> <p>Project-specific risk is assessed by two independent validators, who determine the percent of credits to be set aside in a buffer account in case of a reversal.</p>
Leakage			
<p>The project owner must attest that all forest land outside the project, but within their control, is managed sustainably. This accounts only for internal leakage.</p>	<p>The project owner must attest that all forest land outside the project, but within their control, is managed sustainably. This accounts only for internal leakage.</p>	<p>Activity-shifting leakage within entity boundaries must be quantified. If forest products are reported, market leakage estimation is encouraged.</p>	<p>Leakage effects on all carbon pools are assessed and significant effects taken into account when calculating net emission reductions. Accounting for positive leakage is not allowed.</p>

[†] Land must have been in a non-forested state for at least 10 years preceding the commencement of the offset project.

[‡] A reversal refers to the release of the sequestered carbon, which might be caused by a natural disaster or a failure to maintain proper management.

[§] The 100 year commitment is a recent change in CAR protocol, which formerly required a perpetual conservation easement be placed on enrolled land.

turn profile of the forest owner. While stricter standards are likely to generate higher returns, a price premium is not guaranteed and the costs are greater. It is also critical to recognize that carbon markets are still very young and changing quickly. Domestic regulation and international treaties may drastically change the market structure, offset standards and carbon prices in the near future.

The regulatory environment is uncertain

Carbon is presently traded on a mostly voluntary basis in the U.S., but that may soon change. Over the past several years Congress has debated a number of cap-and-trade bills that would establish a domestic compliance market for carbon. The U.S. Commodity Futures Trading Commission has predicted that if a compliance market were to be created in the U.S, it would be the largest commodity market in the world.²² Demand for carbon offset projects would almost certainly increase as companies looked for the most cost-effective ways to reduce carbon emissions. Despite carbon accounting issues, forest offset projects may be especially attractive to companies as they can be designed to provide additional benefits such as recreational opportunities and ecosystem services to the local communities in which shareholders, employees, and customers live.



In June 2009, the U.S. House of Representatives took the first step toward creating a compliance market by passing the American Clean Energy and Security Act of 2009 (ACES or H.R. 2454). This bill is expected to be taken up by the Senate in the fall of 2009. ACES requires electric utilities, oil refiners, natural gas producers, and some manufacturers to reduce their GHG emissions to 17% below 2005 levels by 2020 and 83% by 2050. The bill allows for up to 2 billion tons of offsets per year, or approximately 28.5%* of total allowances each year for the first 10 years, in-

creasing to 66% of total allowances by 2050. These offsets are to be split evenly between domestic and international projects.

Administration of forest offsets in such a compliance market is likely to fall to the U.S. Department of Agriculture (USDA). A specific offset standard, including rules about which forest projects will be permitted, will be developed through a rulemaking process after the passage of the legislation. The ACES bill does allow projects previously undertaken through CAR and RGGI to be counted toward emissions reductions, and the CCX and VCS are lobbying to have their standards included as well.

In addition to a purely domestic compliance market there is the potential that the U.S. will participate in a post-Kyoto global compliance carbon market. The Kyoto Protocol is set to expire in 2012 and a new international climate treaty will be negotiated in Copenhagen in December 2009. Forest offsets presently play a very small role in the international carbon markets. The EU ETS does not allow any forest offset projects, and the Clean Development Mechanism and Joint Implementation protocols of the Kyoto treaty have severely limited international forest offset transactions (see Appendix B, Page 33). However, there is growing pressure to permit a larger variety of forest offset projects in a post-Kyoto deal. Inclusion of Reduced Emissions from Deforestation and Degradation (REDD) offset projects is a particularly hot topic. If forest offsets are included, tropical forests have a much higher carbon sequestration potential and are likely to compete well against U.S. based forest projects. However, it is interesting to note that U.S. companies who are presently voluntarily buying forest offsets prefer domestic projects.²³



** 28.5% is an approximation because the absolute number of allowances changes slightly each year.

The future of the voluntary market & payments for ecosystem services

The establishment of a compliance market would not necessarily mean an end to the voluntary carbon market. Presently the European Union accounts for the largest source of demand for OTC transactions, despite the existence of the regulated EU ETS.²⁴ While the CCX is set to expire in 2010 and would likely be subsumed by a compliance market, OTC transactions are expected to continue.

Companies primarily participate in voluntary transactions for corporate social responsibility, PR and branding reasons.²⁵ Some companies prefer OTC transactions because they can choose standards with specific carbon accounting approaches; others like the variety of co-benefits created by the flexibility of voluntary transactions.²⁶ Co-benefits are services that a company values on top of carbon sequestration, such as safeguarding biodiversity or promoting human development or poverty reduction. While the offset market is not yet developed enough to place a specific value on various co-benefits, a recent survey of forest offset buyers indicated a willingness to pay a price premium of \$4 or more per ton CO₂e for projects that deliver co-benefits.



The willingness to pay for environmental co-benefits speaks to the fact that forests provide an array of services, of which carbon sequestration is only one. Ecosystem services are benefits provided by the natural world that enhance human well-being, such as reliable clean water supplies or productive soil. Historically, no monetary value has been placed on ecosystem services and as a result their value is normally ignored in business and land management decisions. Markets for ecosystem services create an economic value for these benefits and thus provide an incentive for their conservation. Payments for ecosystem services could provide an additional revenue stream for small forest owners on top of payments for carbon sequestration in the future, but such markets are just beginning to emerge.

Several early-stage efforts to catalyze demand for ecosystem services and help landowners connect to potential buyers are underway. The Marketplace for Nature, coordinated by Defenders of Wildlife, is now in the process of setting up the first of several transactions to demonstrate the demand for ecosystem service offsets. In the Chesapeake Bay area, the Bay Bank is being designed to help landowners identify environmental services on their land and then connect them to others willing to pay for those environmental services. The Willamette Ecosystem Marketplace is a similar ongoing effort in Oregon, working on developing tools and methodologies for certifying various ecosystem service credits.

Congress has also recognized the potential of markets for ecosystem services and in the 2008 Farm Bill established the Office of Ecosystem Services and Markets (OESM). The mission of OESM is to establish technical guidelines for measuring the environmental benefits of land management activities and to help farmers, ranchers, and forest owners participate in emerging environmental service markets. The USDA's Natural Resources Conservation Service is also investing in payments for ecosystem services research through its Conservation Innovation Grant program. Regardless of whether the focus is on carbon sequestration or clean water, clearly forests have a role to play in maintaining ecosystem services. But these market-based mechanisms are only one approach.



Program-Based Payments for Carbon Sequestration

While carbon markets hold enormous potential for reducing GHG emissions, they pose a number of challenges to small forest owners wishing to participate. Project development (see page 15) is a complex process and current market conditions make forest offset projects an uncertain investment. An alternative is an approach that builds on existing government programs to provide direct payments that reward small forest owners for climate change adaptation and mitigation. While such programs are still in the initial phases of conception, the goal is to find a simple way for small forest owners to engage in forest carbon sequestration projects and receive a more reliable return on their investment than carbon markets are able to provide.



Programs that help landowners manage forests so that they can best adapt to climate change already exist. Stewardship and conservation programs like the Forest Legacy Program and Land and Water Conservation Fund, planning tools like the State Wildlife Action Plans, and scientific research all play an important role in helping forests adapt to climate change. But these programs are in desperate need of additional funding. ACES could provide such funding through allocation of auction revenue^{††} to a variety of adaptation programs. Building the resources and capacity of forest adaptation programs has the potential to benefit small landowners through greater technical and financial assistance.

Program-based payments to forest owners could also help incentivize climate change mitigation projects, similar in nature to forest offset projects. A number of existing Farm Bill programs already provide direct payments to farmers for ecosystem services such as

^{††} Adaptation programs are allocated 3% of allowance auction revenue between 2012 and 2021, 6% between 2022 and 2026 and 12% between 2027 and 2050 in the final House version of ACES.

reduced soil erosion and wildlife habitat. Expanding programs such as the Environmental Quality Incentives Program to include payments for carbon sequestration would provide a more reliable income to small forest owners than carbon markets, and thus encourage greater participation. In addition, because program-based sequestration would not be used to directly offset emissions, the need for strict forest carbon accounting might be somewhat alleviated. A more manageable set of criteria and rules for projects could then be developed, easing the project development process and again encouraging greater participation from landowners.

A programmatic approach to forest carbon sequestration is now being considered by Congress. In the spring of 2009 Rep. Pingree (D, ME) introduced a bill (H.R. 2880) to provide incentives to private landowners for management practices that increase carbon sequestration on agricultural and forest lands. A similar but less defined provision was included in the final House version of ACES. As the bill has moved to the Senate, Senator Shaheen (D, NH) has introduced the Forest Carbon Incentives Program Act of 2009 (S. 1576) which will be offered for incorporation into the final Senate version of ACES. Shaheen's bill would establish a USDA program to provide financial incentives on a per-acre basis to small forest owners for certain carbon sequestration activities. This program would limit contracts to 15 years and provide payments for landowners willing to undertake longer conservation easements.

While the details remain hazy, there is great potential for a government program to provide a relatively simple process by which small forest owners can engage in carbon sequestration and gain a reliable payment for doing so. This would ultimately encourage more participation in forest carbon sequestration activities than the carbon markets alone.

What Is Climate Change Adaptation?

Climate change adaptation refers to initiatives and programs that help to reduce the vulnerability of human and natural systems to climate change. Forest adaptation is an important component in fighting climate change because as shifting weather patterns and new distributions of species affect forest ecosystems, their ability to sequester and store carbon – and overall resilience – may be impaired.

What Is Climate Change Mitigation?

Climate change mitigation involves actions that reduce GHG emissions or increase carbon sequestration in order to reduce the extent and force of climate change. Forests are among the best ways to sequester carbon and active forest carbon management is a climate change mitigation strategy.

Opportunities and Challenges for Small Forest Owners

Payments for carbon sequestration present an opportunity for small forest owners to gain a new revenue stream from their forests while reducing the impacts of climate change. Such payments also provide additional benefits: Landowners gain a supplemental income that could help to make working forests profitable, preventing the need to sell or develop land; sustainable forest management is encouraged; and the public gains the many services that healthy forestlands provide, such as clean water, wildlife habitat, and open space. There is the potential for the entire Northern Forest region to benefit.

At the same time, small forest owners must be aware of the challenges that accompany forest carbon projects. Offset development can be complex and expensive. Given the high level of uncertainty regarding carbon regulation and fluctuating carbon prices, landowners should consider not only the potential return but also the financial risk associated with forest carbon projects. And while government programs may be simpler to access and provide a more reliable return, these programs are just beginning to be discussed.

Looking ahead, there is both opportunity and uncertainty in the development of payments for forest carbon sequestration. The Northern Forest region is likely to benefit from careful participation in carbon markets and programs and also from the development of markets for other ecosystem services. By actively engaging in forest carbon pilot projects and ongoing policy discussions now, small forest owners can help to drive these opportunities and ensure the best outcome for the future.



Advancing the Opportunity

As partners in the Northern Forest Investment Zone – supported in part by the US Endowment for Forestry & Communities – Coastal Enterprises, Inc., the Manomet Center for Conservation Sciences, and the Northern Forest Center are examining how emerging markets for forest ecosystem services – with an initial focus on carbon sequestration in managed forests – might provide new revenue for forest landowners and communities.

Ecosystem services represent an important but not well understood new opportunity for landowners in the region. This report and ongoing research focused on ecosystem services aims to help landowners better understand these emerging opportunities. It also aligns closely with the broader goals for the Northern Forest Investment Zone, which is coordinated by the Northern Forest Center. Going forward, partners in the Northern Forest Investment Zone hope to engage with many more landowners, researchers, businesses, and organizations in the region to advance these goals, which include:



Retaining and Restoring Healthy Working Forests

- ◆ Invest in forestry and forest-related enterprises to create a competitive economic basis for retention and stewardship of forests;
- ◆ Quantify forest resources and wood supply on a regional level as a basis for informed forest management and use decisions by forest landowners and businesses;
- ◆ Invest in new forms of forest ownership geared towards sustainable, long term management and a stable land-base;
- ◆ Promote ecologically and economically beneficial changes in harvesting methods by landowners and loggers.

Promoting and Capturing Multiple Value Streams

- ◆ Expand the potential of woody biomass as a source of clean, renewable and sustainable energy for communities and the region;
- ◆ Monetize a greater range of forest ecosystem services, including opportunities for the sale of carbon credits from managed forests;
- ◆ Catalyze innovation and transformational change in wood products manufacturing.

Enhancing Community Capacity, Collaboration and Leadership

- ◆ Connect the work of the region's premier forest products labs and ecosystem scientists with community and business leaders and the public;
- ◆ Increase community forest ownership;
- ◆ Identify and promote ways that new and existing revenues from forests can deliver greater economic, social, and ecological benefits to their host communities.

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Appendix A: Market Inclusion of Forest Carbon Offsets

Market	Description	Forest Carbon Inclusion
Over The Counter (OTC)	The OTC market is comprised of voluntary transactions which are largely project-based. No single standard or registry exists for OTC transactions. Of the 17 identified standards available, the most utilized third-party standard by transaction volume is the Voluntary Carbon Standard (48%), followed by the Gold Standard (12%), the Climate Action Reserve (10%), and the American Carbon Registry Standard (9%). ²⁷	All types of forest offsets are traded through OTC transactions, however different standards deal with such projects in different ways. The Gold Standard, for example, excludes forest projects while the Climate Community & Biodiversity standard imposes rules for forest projects that specifically focus on maximizing biodiversity and social benefits. Each standard has different strengths and limitations in accurately measuring forest carbon. ²⁸
Chicago Climate Exchange (CCX)	The CCX is a membership-based voluntary market in which members commit to a certain level of carbon emissions reduction which they are then bound to by law.	Afforestation, active forest management, and long-lived wood product projects are accepted by the CCX.
Regional Greenhouse Gas Initiative (RGGI)	RGGI is a compliance market in 10 northeastern U.S. states.	Afforestation is the only forest project category accepted under RGGI.
Western Climate Initiative (WCI)	WCI is a compliance market comprised of 5 western U.S. states and British Columbia.	This market is still in the construction phase. Draft recommendations from the summer of 2008 listed afforestation, forest management, forest preservation/conservation and forest products in a list of offset types to be considered.
European Union Emissions Trading Scheme (EU ETS)	The EU ETS is a compliance market comprised of the 15 original states of the European Union.	No forest projects are presently recognized by the EU ETS.
Clean Development Mechanism (CDM)	The CDM is a compliance market under the Kyoto Protocol that allows industrialized countries to offset emissions through projects in developing countries.	Afforestation and reforestation are the only forest project categories accepted under CDM. These offsets are temporary and therefore not fully interchangeable with the rest of the market. The result has been almost no investment in such projects.
Joint Implementation (JI)	JI is a compliance market under the Kyoto protocol that allows emissions offsetting through projects in industrialized, Annex I countries.	Afforestation and forest management are accepted as Joint Implementation projects. JI forestry credits are not temporary and do not expire (unlike CDM).
Kyoto Protocol Allowances (AAU)	The Kyoto allowance market is a compliance market which trades only allowances issued to countries through the Kyoto protocol.	N/A
New South Wales GHG Abatement Scheme (NSW GHGAS)	NSW GHGAS is a project based Australian compliance market.	Forest projects must be located in New South Wales, Australia.

Appendix B: Forest Carbon Aggregator Profiles

The forest carbon aggregator and sub-aggregator profiles included in this report highlight those companies which are most active in the domestic forest carbon aggregation space but this does not represent a comprehensive list of all such entities. The glossary on page 43 and list of acronyms on page 7 may be helpful in reading these profiles.

Aggregator Profiles

- The Delta Institute
- Forecon Ecomarket Solutions
- Forest Opportunities Initiative, Mountain Association for Community Economic Development
- National Carbon Offset Coalition
- North West Neutral, Northwest Natural Resources Group

Sub-Aggregator Profiles

- Carbon Tree
- Red Rocks
- Woodlands Carbon Inc.
- Working Woodlands, The Nature Conservancy

The Delta Institute's Managed Forest Offsets Program

Organization Background: The Delta Institute is a non-profit formed in 1998 to improve environmental quality while promoting community economic development in Illinois and the Great Lakes region.

Carbon Aggregation History: Delta's carbon aggregation program is run through a limited liability corporation called the Pollution Prevention and Energy Efficiency Center, or Delta P2E2. The focus of Delta P2E2 is to provide technical assistance and financing to reduce pollution, trade carbon credits, and improve energy efficiency. The program began aggregating carbon from agricultural offsets in 2006. In 2007 they received a grant from the Michigan Department of Natural Resources to demonstrate carbon sequestration on forestlands. The Michigan Managed Forest Carbon pilot program ultimately served as the basis for the Chicago Climate Exchange's sustainably managed forest protocol.



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Geographic & Landowner Focus: The forest offset program now serves 121 landowners with 130,000 acres in seven states: WI, MI, IL, IN, PA, AR, & TX. Delta P2E2 generally partners with state government agencies in forest offset efforts.

Carbon Offset Standards: Delta P2E2 presently uses the CCX standard for all forest offset projects. While they have considered using both the VCS and CAR standards, they feel that both of these protocols require lengthy levels of commitment and higher upfront costs which will discourage landowner participation.

Carbon Sales: Credits from the 48,600 acre 2007 pilot project carbon pool were sold on the CCX in the summer of 2008 and additional carbon pools were formed in 2008 and 2009. Sales to individuals and small institutions are also made through their retail website.

Sustainable Forest Certification: Delta works with groups of landowners certified through the ATFS.

Outreach: Outreach to landowners was conducted through the Michigan Department of Natural Resources and private forest consultants.

Financial Assistance: A revolving interest-free technical assistance loan fund is available to Michigan landowners to help with up-front costs. Payment is collected from the gross revenue generated by a sale.

Fees: Like most aggregators, Delta P2E2 deducts the \$0.20 cent per ton trading fee collected by the CCX from the gross revenue of each project and charges a 10% fee for its services.

Funding Sources: Additional funding for the program comes from grants from state and federal agencies.

Staff: Delta P2E2 employs three people, of which one is focused on forest carbon.

Forecon Ecomarket Solutions

Organization Background: Forecon Inc. is a private forestry and natural resources consulting firm established in 1954 that provides a range of forestry services to private, corporate, industrial, institutional and municipal forest owners in the eastern U.S.

Carbon Aggregation History: Forecon Ecomarket Solutions is a wholly owned subsidiary of Forecon Inc. that was established in 2004 to provide clients with carbon, water, and conservation-related asset management services. Forecon is a registered carbon aggregator for the CCX.

Sub-Aggregators: Forecon presently works with several consulting foresters as sub-aggregators.

Geographic & Landowner Focus: Forecon works nationally with clients including tribal timberlands, institutional investors including Timber Investment Management Organizations, and governmental and non-governmental organizations. They manage numerous forest offset projects, including a carbon pooling program specifically for non-industrial private forest owners. The minimum size acreage that is eligible to participate at present carbon prices is 250 acres.

Carbon Offset Standards: Forecon specializes in CCX forestry offset projects, but also works with other programs and standards such as VCS, CAR, and RGGI.

Carbon Sales: The company presently has just over 8,000 acres of non-industrial private forestland registered on the CCX in its first fund, with another 30,000 acres under development.

Sustainable Forest Certification: Forecon works with ATFS, FSC, and SFI certified lands.

Outreach: Outreach to landowners is conducted via landowner meetings and through professional forestry organizations.

Financial Assistance: Limited funding may be available for qualified participants through carbon financiers.

Fees: Like most aggregators, Forecon Ecomarket Solutions deducts the \$0.20 cent per ton trading fee collected by the CCX and annual verification fees from the gross revenue of each project and charges a 10% fee for its services. When working with a sub-aggregator, a competitive commission rate is negotiated based on the tasks to be assumed by the sub-aggregator.

Funding Sources: None. Forecon Inc. is a private, for-profit company.

Staff: Forecon Ecomarket Solutions employs 4 people, of which 2 focus on the non-industrial private forest carbon pool.



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Forest Opportunities Initiative, MACED

Organization Background: The Mountain Association for Community Economic Development (MACED) was established in 1976 by ten Community Development Organizations in Central Appalachia. MACED's mission is to improve life in mountain towns through community and business development.

Carbon Aggregation History: The Forest Opportunities Initiative promotes sustainable forest management through education, financial planning & loans, and technical assistance. Carbon aggregation services were incorporated into the program in 2008, when MACED became a registered carbon aggregator on the CCX.



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Sub-Aggregators: MACED does not work with sub-aggregators at this time.

Geographic & Landowner Focus: The program works with non-industrial forests of all sizes in the Appalachian region of Kentucky, Ohio, Tennessee, Virginia, and West Virginia.

Carbon Offset Standards: The forest offset protocol followed by the program was developed in-house and can be modified to meet CCX, VCS, or CAR requirements. Initially the program has focused on marketing carbon pools on the CCX but will pursue OTC transactions in the future.

Carbon Sales: As of July 2009 MACED has a carbon pool with 31 landowners and 16,000 acres in 2 states registered on the CCX but has not yet made a sale. Additional carbon projects are under development.

Sustainable Forest Certification: Both FSC, SFI and ATFS certifications are accepted by the program but most landowners in the central Appalachian region have ATFS certification.

Outreach: Outreach to landowners began with presentations at landowner meetings (mostly coordinated through NRCS extension offices), radio interviews, and advertisements in newspapers.

Financial Assistance: A revolving loan fund at a 5% annual interest rate is available to landowners to cover up-front expenses. Payment is deducted from the revenue generated from the sale of the carbon credits.

Fees: Like most aggregators, MACED deducts the \$0.20 cent per ton trading fee collected by the CCX from the gross revenue of each project and charges a 10% fee for its services.

Funding Sources: Additional funding for the program comes from foundations including the U.S. Endowment for Forestry and Communities, the Blue Moon Fund, and the Ford Foundation.

Staff: The program employs 3 staff members, all of which are focused on forest carbon aggregation.

National Carbon Offset Coalition

Organization Background: The National Carbon Offset Coalition (NCOC) is a non-profit that was founded in 2001 to help farmers, ranchers, private forest owners and tribal and state governments in the U.S. access a new revenue stream in the form of carbon offsets derived from their land. The organization was started by several Montana-based Resource Conservation & Development Councils with initial funding from a pilot international forestry offset sale in 2001 and from the state of Montana, the USDA, & U.S. EPA. From 2003 to 2009 NCOC was funded by the U.S. Department of Energy Big Sky Carbon Sequestration Partnership led by Montana State University. NCOC now derives all of operating funds from the sale of offsets on the exchange.

Carbon Aggregation History: NCOC became an official aggregating member of the CCX in 2005 and currently has a portfolio of soils (crop & range) and forestry offsets on the CCX. Since 2008 NCOC has been working with non profit and for profit forestry organizations to bring management of existing forest stands and credit for long term wood products to the CCX market.

Current Forestry-Based Sub-Aggregators: Carbon Tree, Woodlands Carbon, Red Rocks.

Geographic & Landowner Focus for Forestry: NCOC works nationally with a focus on the forest management and wood products offset categories. Landowners engaged through sub-aggregators range from small timber operators, to tribal governments and large forestry management companies.

Carbon Offset Standards: The organization works exclusively with offsets created using CCX protocols.

Carbon Sales: As of mid-2009 NCOC has twelve (12) soils and forestry pools contracted or registered on the CCX, involving over 3 million tons of offsets. Most trades are conducted via the CCX trading platform. NCOC also pursues OTC sales through external energy brokers.

Sustainable Forest Certification: NCOC works with all sustainable forest certifications.

Forestry Outreach: Outreach to landowners is primarily conducted by sub-aggregators, though NCOC also undertakes basic carbon offsetting education at landowner workshops.

Financial Assistance: NCOC does not offer financial assistance to landowners in the establishment of their pools but does offer technical assistance through NCOC contractors or sub-aggregator organizations. Landowners are encouraged to check for local, state or federal funding or technical assistance to develop their individual projects.

Fees: There is a .20 cent per ton carbon registration and trading fee charged by CCX for all projects registered on the exchange. Third party verification fees also required by CCX are the responsibility of the landowner. NCOC commissions range from 10 to 15% depending on whether a landowner works directly with the exchange or participates through the assistance of a sub-aggregator. All fees are taken at the time of trade.

Funding Sources: NCOC now operates totally through the sale of carbon offsets.

Staff: The NCOC Board of Directors is comprised of the founding Montana-based RC&D's and a conservation district based non-profit organization. In order to reduce operating costs and fees, the organization presently employs only one person with all additional support from consultants, contractors, and sub-aggregators. This network now stretches across the U.S. with twenty nine (29) affiliate and sub-aggregator organizations and three principle technical contractors.



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Northwest Neutral, Northwest Natural Resource Group

Organization Background: The Northwest Natural Resource Group (NNRG) is a non-profit, founded in 1992 and presently focused on supporting the growth of a profitable, sustainable, and environmentally sound timber industry while improving forest and freshwater ecosystems in Washington state.

Carbon Aggregation History: NNRG's carbon program, NW Neutral, began in 2007 as an offshoot of their Northwest Certified Forestry Program, which among other services provides a group management plan for FSC certification to approximately 115 forest owners with a combined 24,000 acres.

Sub-Aggregators: Northwest Neutral does not work with sub-aggregators.

Geographic & Landowner Focus: Northwest Neutral works with non-industrial private forest owners of all sizes in Washington and Oregon.

Carbon Offset Standards: The organization has developed their own managed forest carbon offset protocol, which was used for a pilot project with two landowners in 2008. The protocol, based on FSC certified forestry, measures increased sequestration from lengthened rotations and increased retention. The program is now engaging with VCS for third-party certification.

Carbon Sales: Carbon offsets from the pilot project were sold to EcoHaus, a local green building materials retailer, in March of 2009 for \$20/ton. The organization pursues OTC sales and does not plan on engaging in the CCX.

Sustainable Forest Certification: Northwest Neutral uses only FSC certification for its offset projects.

Outreach: Outreach, presently focused on landowners already enrolled in the Northwest Certified Forestry Program, is conducted via workshops, newsletters, educational materials, individual assistance, etc.

Financial Assistance: Landowners must pay for a carbon inventory on their property (~\$20/acre) and must have a long term forest management plan. Carbon offset potential has been used by a local community development financial institution as loan capital for land purchase.

Fees: Northwest Neutral charges a 7% fee for its aggregation and brokerage services.

Funding Sources: Additional funding for the program comes from government and private foundation grants.

Staff: The Northwest Natural Resource Group employs five full time staff and two interns. All staff are involved in some aspect of the Northwest Neutral program.



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CarbonTree

Organization Background: CarbonTree LLC was established in late 2008 by the Empire State Forest Products Association and the American Forest Foundation in order to aggregate and trade sequestered carbon credits from managed forest lands.

Aggregator: The National Carbon Offset Coalition presently verifies, registers, and brokers sales on behalf of CarbonTree.

Carbon Aggregation History: CarbonTree is now accepting applications with open pools for New York/New England, Massachusetts, the Adirondacks and the Catskills.

Geographic & Landowner Focus: CarbonTree aggregates carbon from ATFS certified landowners in the northeastern U.S. The company will accept applications from landowners of any size but parcels under 100 acres are unlikely to be profitable at present (July 2009) prices.

Carbon Offset Standards: CarbonTree is using CCX managed forest protocols for its first carbon pools, and may consider working with other standards in the future.

Carbon Sales: The first carbon pool is expected to be registered on the CCX in 2010. The company will trade both on the CCX and through OTC transactions brokered by NCOC.

Sustainable Forest Certification: CarbonTree works with ATFS certified lands.

Outreach: Outreach to northeastern landowners includes direct mailings and workshops.

Financial Assistance: A revolving loan fund is available to participants for carbon inventory costs. Massachusetts landowners may qualify to receive payment from the Massachusetts Department of Conservation for carbon inventory costs.

Fees: A \$0.20 cent per ton CCX trading fee along with verification fees, a 5% brokerage fee, and 12% aggregation fee are deducted from proceeds upon sale.

Funding Sources: Start-up costs for the company were funded with a 3 year grant from the American Forest Foundation.

Staff: CarbonTree presently contracts for staffing, data management, and technical services.



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Red Rock Enterprises

Organization Background: Red Rock Enterprises, LLC was started in 1993 and buys standing timber, logs and lands throughout the Appalachian region.

Carbon Aggregation History: The company started work on carbon aggregation in 2008, when it pioneered the use of a remote sensing technology in completing a carbon inventory. The CCX approved this initial pilot project and the company is now completing the baseline of a larger 27,000 acre pool in the mid-Atlantic region. Remote sensing is a lower cost alternative to timber cruising, which is normally used for establishing the carbon baseline for a forest offset project.

Aggregator: The National Carbon Offset Coalition presently registers and brokers sales of carbon pools on behalf of Red Rock.

Geographic & Landowner Focus: Red Rock works in MD, PA, WV, VA, and OH with landowners of all sizes. Carbon pools generally consist of at least 10,000 acres.

Carbon Offset Standards: CCX protocols are presently used for managed forest offset projects. Red Rocks is in the process of investigating CAR and may use that standard in the future.

Carbon Sales: The company is now registering its first project of 200 acres, which will likely be sold together with a second pool of 11,000 acres.

Sustainable Forest Certification: Red Rock presently uses FSC certification for forest offset projects and may use ATFS certification in the future.

Outreach: Landowners are engaged through focus groups, mailings, and general outreach to the company's existing client base.

Financial Assistance: Red Rock is presently covering up-front costs for landowners who wish to participate in carbon aggregation and will recoup their costs from the gross revenue realized from the sale of offsets at the going interest rate.

Fees: The CCX deducts a \$0.20 cent per ton trading fee from the proceeds of a sale. A 15% aggregation fee and other unpaid up-front expenses (such as the cost of forest certification) are also deducted.

Funding Sources: Red Rocks is a private, for-profit company.

Staff: The company employs 9 people of which 2 are focused on carbon aggregation.



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Woodlands Carbon

Organization Background: Woodlands Carbon was established in 2008 by the Oregon Small Woodlands Association (OSWA) in partnership with the American Forest Foundation. Woodlands Carbon aggregates and trades sequestered carbon credits from certified woodland owners in the Western United States. The aim is to create access to carbon markets for small woodland owners.

Aggregator: The National Carbon Offset Coalition presently verifies, registers, and brokers sales on behalf of Woodlands Carbon on the CCX. Woodlands Carbon also works directly with buyers in OTC trades.

Carbon Aggregation History: Aggregation of the first carbon pool is ongoing in mid-2009.

Geographic & Landowner Focus: Woodlands Carbon aggregates carbon from CCX eligible certified landowners in the Western U.S. The company will accept applications from landowners of any size.

Carbon Offset Standards: Woodlands Carbon pioneered the use of CCX managed forest protocols in western forests and presently uses the CCX standard for managed forest offsets as the basis for its contracts.

Carbon Sales: The first carbon pool is expected to be registered on the CCX in December, 2009. The company will trade both on the CCX via NCOC, and through OTC transactions brokered by NCOC or Woodlands Carbon itself.

Sustainable Forest Certification: Woodlands Carbon works with all sustainable forest certifications.

Outreach: Outreach to landowners within the ATFS database, OSWA membership database and other collaborators includes newsletter updates, website postings, field workshops and landowner site visits.

Financial Assistance: A revolving loan fund is available to participants for up-front costs at a 0% interest rate.

Fees: Woodlands Carbon's aggregator, the NCOC, deducts the \$0.20 cent per ton trading fee collected by the CCX and annual verification fees from the gross revenue of each project and charges a 5% fee for its services. Woodlands Carbon charges an additional 11% fee on gross revenue for its services.

Funding Sources: Start-up costs for the company were funded with a 3 year grant from the American Forest Foundation.

Staff: Woodlands Carbon is coordinated by the OSWA and mostly run through contractors.



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Working Woodlands, The Nature Conservancy

Organization Background: The Nature Conservancy (TNC) was established in 1951 for the purpose of preserving the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.

Carbon Aggregation History: Initiated in 2008, Working Woodlands is a program of TNC's Pennsylvania Forest Conservation Program focusing on forest carbon aggregation in priority forest landscapes of the eastern U.S. In mid-2009, the program is in the process of forming its first carbon pool from land TNC holds or is presently developing working forest conservation easements on. Carbon pools are expected to be composed of 8-10 parcels totaling 10,000 acres with at least one "anchor parcel" >5,000 acres.



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Aggregator: The program is presently in the process of selecting a forest carbon aggregator.

Geographic & Landowner Focus: Based in Pennsylvania, the program is focused on working with private forest landowners within priority forest landscapes in the eastern U.S. The minimum parcel size is expected to be 250-300 acres given modest carbon prices and the fact that TNC and their aggregator are covering all up-front project costs (e.g., inventory, management planning, certification, project development, validation, and monitoring/auditing) for landowners.

Carbon Offset Standards: The program uses CAR and VCS carbon protocols paired with the FSC sustainable forest certification and is focused on creating high-quality forest offsets that provide additional environmental benefits such as wildlife habitat and clean water.

Carbon Sales: The first carbon pool is expected to go up for sale in 2010. The program is focused on OTC sales and does not plan to engage in the CCX at present.

Sustainable Forest Certification: Working Woodlands uses FSC certification for its forest offsets.

Outreach: Landowners are notified about the program via face-to-face contacts with PA Forest Conservation Program forestry staff. TNC-PA foresters and cooperating private consulting foresters conduct the forest inventory and stand analysis, prepare the forest management plan, and enroll the property under TNC-PA's FSC forest management certificate.

Financial Assistance: The program pays for all up-front forest planning, certification, and carbon project expenses and will back this cost out of the gross revenue over 10 years of carbon sales, essentially providing a zero interest loan to forest owners.

Fees: TNC and the aggregator will retain a percentage of gross revenues to cover forest management, certification, and carbon project expenses. If, at higher carbon prices, TNC realizes a profit from their share of carbon revenues, that money would likely be used to offset conservation easement purchases and/or to set up a low-interest revolving stewardship loan fund to implement forest management practices on land enrolled in the carbon aggregation program.

Funding Sources: Program start-up costs are being funded by TNC and the aggregator.

Staff: Working Woodlands is staffed primarily by the TNC-PA Forest Conservation Program consisting of two foresters and a forest ecologist. Several other TNC staff in the PA Chapter and world office provide program support in planning, finance, and marketing. The aggregation and marketing firm provides significant staff time for financial and marketing support.

Glossary

Active Forest Management - Carbon sequestration through particular forest management practices. If a forest is being harvested, wood products may provide sequestration value.

Adaptation - Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects.

Additionality - Greenhouse removal that is in addition to what would have occurred in the absence of the project.

Afforestation - Carbon sequestration through the creation of forests on land that was previously un-forested, typically for longer than a generation.

Aggregator – An organization that combines the carbon sequestered by multiple landowners into one common pool for the purpose of market interactions.

Allowance - A government issued authorization to emit a certain amount of carbon into the atmosphere. In carbon markets, an allowance is commonly denominated as one ton of carbon dioxide, or equivalent carbon dioxide (CO₂e).

Avoided Deforestation - Avoided carbon emissions via conservation of existing carbon stocks.

Baseline – The amount of carbon that would have been stored in absence of the project.

Brokerage fee – A fee charged by the organization that manages a sale in a market transaction.

Cap-and-trade - A cap-and-trade program is one in which a government or regulatory body first sets a limit or “cap” on the amount of environmental degradation or pollution permitted in a given area and then allows

firms or individuals to trade permits or credits in order to meet the cap.

Carbon credit - Units of carbon emissions that can be purchased or sold between participating members (i.e. countries, corporations, etc.) in order to meet compliance with carbon emission allowance.

Carbon emissions - Carbon dioxide that enters the atmosphere as a result of human activity, especially the burning of carbon-based fuels.

Carbon inventory – A record of the amount of carbon presently sequestered in various parts of a given forest area.

Carbon footprint – A measurement of the amount of carbon dioxide that is emitted by an individual, organization or state over a given amount of time.

Carbon market – The buying and selling of carbon credits.

Carbon monitoring – Tracks how much carbon dioxide is produced or sequestered by an activity over time.

Carbon offset – The purposeful reduction of greenhouse gasses (GHG), which is used as a financial instrument to neutralize GHG emissions elsewhere.

Carbon offset standard – A set of criteria and rules that certify the quality of a carbon offset project.

Carbon pool – 1.) The combined carbon sequestration potential from multiple small projects, pulled together for the purpose of market interactions. A forest carbon pool typically includes the offsets generated from at least 10,000 acres of forestland. 2.) The components of a forest ecosystem that accumulate or release carbon, specifically, live and dead biomass and soil.

Carbon registry - An organization that provides serial numbers and records the purchase, sale, and retirement of a carbon offset.

Carbon sequestration - The process of removing atmospheric CO₂, either through biological processes (e.g. plants and trees), or geological processes through storage of CO₂ in underground reservoirs.

Co-benefits – The positive environmental and social impacts (intended or unintended) associated with a project's implementation, such as job creation or the conservation of biodiversity.

Compliance market – A carbon market that is created and regulated by government through a cap-and-trade program.

Conservation easement - Legal contracts that restrict the use and development of a piece of land, usually in perpetuity.

Ecosystem Service – Resources and processes provided by an ecosystem which benefit people, such as clean drinking water, carbon sequestration, reduced soil erosion or biodiversity.

Forest carbon project – see forest offset.

Forest offset – The purposeful reduction of greenhouse gases (GHG) through afforestation, reforestation, active forest management, or avoided deforestation that is used as a financial instrument to neutralize GHG emissions elsewhere.

Forest management plan – Written guidelines for the current and future management of a forest, to meet the forest owner's objectives.

Greenhouse gas (GHG) - Gases that trap the heat of the sun in the Earth's atmosphere, producing the greenhouse effect. The two

major greenhouse gases are water vapor and carbon dioxide. Other greenhouse gases include methane, ozone, chlorofluorocarbons, and nitrous oxide.

Kyoto Protocol - An international emissions reduction treaty signed in 1997 in the Japanese city of Kyoto. It is a protocol to the UN Framework Convention on Climate Change, under which the signatories are obligated to cut overall greenhouse gas emissions by an average of 5.2% below 1990 levels over the period 2008-2012.

Leakage - When a project causes emissions to shift to other locations.

Market-based payments – Payments for carbon sequestration received through the carbon market.

Mitigation – Actions to reduce greenhouse gas emissions and increase carbon sequestration for the purpose of lessening the impacts of climate change.

Offset - The purposeful reduction of greenhouse gases (GHG), which is used as a financial instrument to neutralize GHG emissions elsewhere.

Opportunity cost – The value of the next best alternative that is foregone as the result of making the decision.

Over-the-counter transaction – Trade of a financial instrument directly between two parties rather than through an established exchange.

Permanence - The ability of a project to remove GHGs from the atmosphere for a significantly long time.

Program-based payments - Payments for carbon sequestration received through a government program.

Project Design Document (PDD)- A document that describes the characteristics of an offset project, including information from the carbon inventory, forest management plan, sustainable forest certification, and growth yield modeling.

Reforestation - Carbon sequestration through restoration of forests on land that was once forested.

Risk-return profile – The risk tolerance and return expectations of particular investor.

Sub-aggregator – Organizations that coordinate the outreach and development of a carbon offset project.

Sustainable forest certification – Confirmation by an external review that sustainable forest management is being employed by a forest owner.

Transaction cost – The costs incurred in making an economic exchange.

Verification – Confirmation that the carbon baseline and management plan is correct.

Voluntary carbon market – A carbon market that is entered into voluntarily by buyers and sellers, and not because of government regulation.

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Collaborators on this Report

Coastal Enterprises, Inc. (CEI) is a Community Development Corporation and Community Development Financial Institution (CDC/CDFI) dedicated to creating economically and environmentally healthy communities in which all people, especially those with low incomes, can reach their full potential.

Manomet Center for Conservation Sciences. As one of the nation's oldest independent environmental research organizations, Manomet is working to achieve a more sustainable future. Manomet convenes stakeholders and helps develop science-based, enduring solutions that work in the real world and improve conditions for wildlife, habitats and people.

The Northern Forest Center is a non-profit founded in 1997 to strengthen communities, revitalize the economy and conserve the landscape of the Northern Forest of Maine, New Hampshire, Vermont, and New York.

The U.S. Endowment for Forestry and Communities, Inc. is a not-for-profit corporation established at the request of the governments of the United States and Canada in accordance with the terms of the Softwood Lumber Agreement of 2006 between the two countries. The mission of the Endowment provides that: The Endowment works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.



About the Author

Becca Brooke is a dual MS/MBA student at the University of Michigan's School of Natural Resources and Stephen M. Ross School of Business, graduating in the spring of 2010. A Maine native, Becca has focused her graduate studies on environmental policy and payments for ecosystem services. Her master's project for the National Wildlife Federation analyzed the connection between ethanol subsidies, land use change and wildlife habitat on the Great Plains, with a focus on USDA Farm Bill programs. Prior to graduate school, she worked for the Association of Fish and Wildlife Agencies in Washington D.C. on a national campaign for new and greater funding for wildlife conservation. In her free time she enjoys hiking, biking, cooking, and travel. Becca holds a BA in Biology and Environmental Studies from Oberlin College.