

Valuing the Carbon Benefits of Your Sugarbush

Alexandra M. Kosiba, Anthony W. D'Amato, Christopher Lindgren

FBFS 072 – 4/24 Acer Series: Sap Business Promotion

Introduction

As a sugarbush owner you may be interested in exploring your options to benefit from the carbon value of your woods. Perhaps you're considering selling carbon offsets from your sugarbush in a carbon market, or maybe you are interested in utilizing the carbon your sugarbush sequesters and stores to offset emissions from your sap or syrup operations. Sugarbushes present a promising opportunity for both positive ecological and economic impact. Understanding how forest carbon benefits are estimated and transacted is a pivot step toward sustainability. Current options are discussed in more detail below so you can determine the right fit for your sugarbush.



Illustration by Erick Ingraham for Northern Woodlands magazine

Carbon Offsets

Carbon offsets operate on the principle that greenhouse gas emissions generated in one location can be balanced out – or offset – by carbon sequestration and storage in another location. Each carbon offset represents the reduction or removal of one metric ton of carbon dioxide for a specified duration. By purchasing enough offsets to match their emissions, a buyer can claim to achieve “net zero” emissions.

It is essential to note that once you sell carbon offsets from your sugarbush, the associated carbon benefits are utilized. Therefore, you may want to consider directing the carbon value of your sugarbush towards offsetting the impacts of your sap or syrup operation.¹

¹ Transactional costs and other market frictions diminish the ultimate economic and ecological value of carbon credits. This generally makes “in-house” use of highest value.

In a sugarbush, carbon offsets are generated through tree growth (“sequestration”) and by maintaining carbon stored in the forest (“avoiding emissions”). Refer to *FBFS 070: Forest Carbon in Your Sugarbush* for background information on forest carbon and *FBFS 071: Enhancing the Carbon Benefits of Your Sugarbush* for carbon-focused management strategies. Because offsets are intended to compensate for actual greenhouse gas emissions, it is crucial that they represent a measurable carbon benefit that is additional to what would have occurred otherwise, and that this benefit persists for a specified duration.

Establishing a **baseline** is essential for determining the additional carbon benefit. The baseline represents the forest's carbon storage potential without generating carbon offsets. It may also be referred to as business-as-usual or common practice. Determining the baseline presents one of the biggest challenges, and sources of debate, in generating carbon offsets. For instance, the baseline may be estimated as the carbon storage potential of the sugarbush if the landowner harvested the maximum allowable amount by law. Alternatively, it might be calculated based on the average carbon storage in nearby forest monitoring plots with a similar forest composition.

The difference in carbon stored in your sugarbush between the baseline and under carbon-focused management is called **additionality**. This serves as the foundation for determining the quantity of carbon offsets generated by your sugarbush. Demonstrating true additionality in existing sugarbushes may pose a challenge because sugarbushes are typically managed differently from woodlots; most mature trees are maintained rather than harvested as standard practice. Consequently, proving additionality in existing sugarbushes can be more complex as the landowner may need to demonstrate a change in management. Given these considerations, newly established sugarbushes, particularly in regions experiencing high rates of forest loss due to new development and other activities, may be more suitable for participation in carbon markets because they can more clearly demonstrate additionality if the enrolled parcel is kept as forest.

Sugarbush owners should be aware of factors that could diminish the intended carbon benefits. Natural disturbances like hurricanes, fires, and insect infestations, coupled with the stress of a changing climate, can lead to tree mortality and reductions in carbon storage. As emphasized in *FBFS 071: Enhancing the Carbon Benefits of Your Sugarbush*, managing your sugarbush for resilience is crucial for ensuring long-term carbon benefits. Additionally, if you sell carbon offsets from your sugarbush, you may be required to allocate offsets to a **buffer pool** to act as a reserve for unforeseen losses.

Another factor that can diminish the intended benefit of carbon offsets is **leakage**. Leakage occurs when reductions in timber harvesting in one location led to increased harvesting elsewhere to meet market demands, or when people opt for more carbon-costly materials in place of wood. Because sugarbushes are not primarily managed for wood products, leakage is less of a concern compared to a traditional woodlot. However, when selling carbon offsets, sugarbush owners may still need to allocate a portion of the generated offsets to address potential leakage. The total number of offsets generated from a sugarbush is determined by the additionality relative to the baseline, with deductions made for the buffer pool and adjustments made to compensate for leakage.

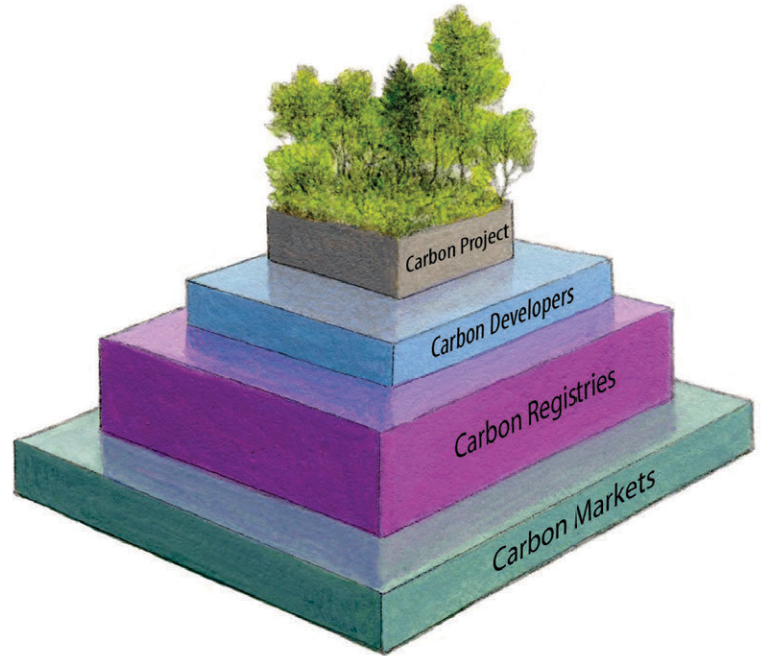


Illustration by Erick Ingraham for Northern Woodlands magazine



Calculating, verifying, and monitoring additionality for carbon markets is complex and costly. Because of this, forestland owners seeking to participate in carbon markets typically work with a carbon offset developer. Offset developers oversee the documentation, accounting, verification, marketing, and selling of carbon offsets, and in doing so, they bear the financial risk. Developers are compensated for this work using an agreed upon portion of proceeds once the offsets have been sold, typically between 20 and 50%.

Carbon offsets are bought and sold in **carbon markets**. There are two types of markets: compliance (or regulatory) and voluntary. Compliance markets, such as California's Cap-and-Trade program, are created by governments to require certain greenhouse gas emitters, such as power plants and factories, to reduce their emissions over time. Emitters can purchase a percentage of required emissions reductions as offsets from certified projects. Over time, the percentage that is eligible to be offset decreases to force emitters to make enduring shifts away from fossil fuel usage.

The voluntary carbon market is unregulated and emitters can participate at will. To provide a level of oversight, offset developers may seek approval of their methods by third party organizations, such as the American Carbon Registry or Climate Action. Such third-party verifications generally increase credibility and appeal to buyers. Voluntary carbon markets allow anyone to purchase offsets; buyers choose what percentage of their emissions they offset and there is no requirement for buyers to reduce emissions over time. This lack of regulation has led to concern that the voluntary market could give emitters a perpetual "license to pollute."

Most sugarbush owners interested in selling forest carbon offsets will do so in the voluntary market because of geographic limitations to selling carbon offsets in existing compliance markets. Although larger forest parcels (greater than 2,000 acres) have been eligible to sell offsets in the voluntary market for some time, programs for smaller parcels have only recently been made available. Two examples are the Family Forest Carbon Program (developed by American Forest Foundation and the Nature Conservancy) and the Conserve Program (developed by Forest Carbon Works). These programs reduce per parcel costs by pooling enrolled acreages and their generated offsets together.



Photo credit: Luke Ingram

If you are not interested in selling carbon offsets or not able to participate in current markets, but still want to quantify and understand the carbon dynamics in your sugarbush, you can hire a consultant to estimate the carbon benefits of your sugarbush. Hiring a third party helps to reduce conflicts of interest, plus accurately measuring carbon in your woods requires technical skills and specific equipment. If you are looking for a rough estimation of carbon storage and sequestration in your sugarbush, online calculators can be helpful such as Northeast Forest Carbon.

The revenue generated from selling carbon offsets can help sugarbush owners pay taxes and fund stewardship-related activities, or to contribute to investments in your business. A key factor determining revenue potential is the sale price of an offset. Compliance markets typically set the price of an offset, and periodically increase the price to incentivize transitions away from fossil fuels. In contrast, the sale price of an offset in the voluntary market varies depending on demand, the reputation of the developer, and marketing. While exact prices of offsets sold in the voluntary market are not publicly disclosed, the current average global price of a forest-based offset is about \$11. For forest-based projects that have occurred in New England, landowners have generated between 0.5 and 2 carbon offsets per acre per year.

Because the total number of offsets generated from a forest depends on its size, larger parcels typically yield higher total revenue. Site and forest factors also affect the additionality, as certain forest types and locations may generate more revenue than others. Some newer programs for smaller parcels combine multiple enrollees to ensure uniform per-acre payments. Carbon offset developers also have different payment schedules. Payments may occur regularly over time, begin with an upfront payment and smaller payments at specified intervals, or only occur at the end of the contract.

Requirements of Participating in Carbon Offset Markets

If you sign up with an offset developer to sell carbon offsets, you are required to manage your sugarbush within specific guidelines for the length of the contract. Some offset developers disallow any tree harvesting, while others allow active management but stipulate the amount of wood volume that is permissible to be harvested. In the voluntary market, the length of the contract may be 10, 20, or 40 years. However, in compliance markets, the length often exceeds 100 years. An important benefit of these long-term commitments is to prevent deforestation and conversion of the sugarbush into other land use types, which not only maintains the carbon benefit but also the other important ecosystem services that the forest provides, such as wildlife habitat and flood mitigation.

Before signing a contract to sell carbon offsets from your sugarbush, it is critical to understand the terms of the contract and implications. Important practical considerations are the length of the contract, stipulations about early termination, management restrictions, responsibilities for long-term monitoring costs, and contingencies if the sugarbush fails to meet the expected carbon benefits. Another important consideration to be aware of before enrolling is whether the parcel has any legal encumbrances that mandate or restrict certain activities. We recommend consulting with a lawyer on contract terms and with an accountant for revenue estimates. Currently carbon sales are taxed as income.

Next Steps for Landowners Interested in Selling Offsets

If you are interested in exploring whether selling carbon offsets is a good fit for you and your sugarbush, a recommended initial step is to take advantage of the growing number of resources and information geared for landowners by local forest landowner groups, state extension services, state and federal governments, universities, and consortiums such as Northeast Forest Carbon. It may also be helpful to consult with a professional forester who can assist you in defining objectives for your land, identifying any legal restrictions, and evaluating the current state of your forest.

Next, reach out to different carbon offset developers² which will help you determine whether your sugarbush qualifies for enrollment and if proceeding is financially viable. It is important to note that developers have eligibility criteria tied to factors such as parcel size, tree density, accessibility, and pre-existing legal encumbrances that limit harvesting or land clearing. Not all sugarbushes will be eligible for enrollment.

² <https://www.northeastforestcarbon.org/forest-carbon-financial-markets/>

Next steps for landowners interested in offsetting emissions from production operations

Understanding the carbon dynamics of your maple operations, including both sequestration and emissions, is pivotal for effective decarbonization efforts. If you are serious about reducing emissions and climate impacts, it is important to begin to analyze your operations to identify ways to reduce emissions. Estimating the emissions from your sap or syrup operations requires analysis of the carbon implications of your infrastructure, equipment, processing, packaging, and transport. “Net Zero Maple Syrup” by Paul Renaud explains emissions scoping in detail. For rigorous reporting, a consultant can help quantify the impacts of your operations.

Currently, the easiest way to offset the emissions from sap and syrup production of your sugarbush is to enroll in a carbon offset program with a developer and simply buy the number of offsets you need to compensate for the emissions from infrastructure and equipment, boiling, packaging, and transport. Computing these emissions can be difficult and there are no carbon offset developers who provide this service currently, but that may change in the future. Keep in mind that if you sell all the carbon offsets generated from your sugarbush, you cannot also use that carbon benefit to offset your own emissions.

A less rigorous approach would be to manage your sugarbush with carbon-focused strategies as outlined in **FBFS 071: Enhancing the Carbon Benefits of Your Sugarbush** and your business with carbon-reducing strategies. Consumer interest in carbon friendly products can be harnessed to drive sales. Whatever your approach, transparency in reporting and authenticity in marketing are fundamental to customer engagement. Many of these strategies overlap with other programs, such as “bird friendly” maple and organic certification. New certifications are likely to develop as interest in climate friendly and sustainable products increases.



Photo credit: Steve Hagenbuch

Accounting for the carbon benefits of your sugarbush is both complex and new. The options available to be paid for the carbon benefits your sugarbush provides will change over time. Carbon offset markets are under immense scrutiny and our understanding of the science of forest carbon continues to advance. As a result, programs will continue to evolve. There may also be efforts to provide technical assistance to sap and syrup producers to account for the carbon benefits of their sugarbushes to offset their own emissions. Learning about the carbon dynamic in your forest ecosystem and in your operations is the first step toward understanding how to best reduce your climate impacts and best utilize the value of the carbon sequestered and stored in your sugarbush.

References and Additional Resources

Kosiba AM. “Payments for Forest Carbon.” *Northern Woodlands*, Winter 2023, pp. 34-41.
<https://northernwoodlands.org/articles/article/payments-forest-carbon>

Securing Northeast Forest Carbon. Regional clearinghouse for information on forest carbon, including offset programs.
<https://www.northeastforestcarbon.org/>

Renaud, Paul. “Net Zero Maple Syrup.” *Maple Digest*. <https://mapleresearch.org/wp-content/uploads/md6023netzero.pdf>

FBFS 070: Forest Carbon in Your Sugarbush,
<https://www.uvm.edu/extension/agriculture/business/sites/default/files/inline-files/forest-carbon-in-your-sugarbush.pdf>

FBFS 071: Enhancing the Carbon Benefits of Your Sugarbush,
<https://www.uvm.edu/extension/agriculture/business/sites/default/files/resources/Enhancing%20the%20Carbon%20Benefits%20of%20Your%20Sugarbush.pdf>

For additional information and resources, visit The Maple Manager website (www.maplemanager.org).



Material adapted from Kosiba (2023)

Editing and design by UVM Extension Media Team, Cathy Yandow and Alec Julien.

Funding for this resource was made possible by the U.S. Department of Agriculture’s (USDA) Agricultural Marketing Service (AMS) Acer Access and Development Grant Award 21ACERVT1002-00. Its contents are solely the responsibility of the authors and do not necessarily reflect the official views of the USDA.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. University of Vermont Extension, Burlington, Vermont. University of Vermont Extension, and U.S. Department of Agriculture, cooperating, offer education and employment to everyone without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or familial status. Any reference to commercial products, trade names, or brand names is for information only, and no endorsement or approval is intended. April 2024.