

You Get What You Pay For, Part II: A Timberland Investor's Evolving Perspective on Forest Carbon Offsets

Jim Hourdequin

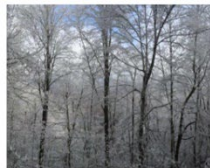
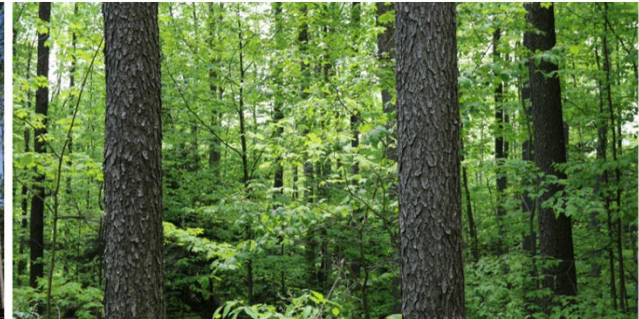
Address to the Yale Forest Forum

October 27, 2022

Thank you. It's a privilege to be here. Despite Lyme's long-standing connection with the Yale School of the Environment and many friends, colleagues, and business partners who graduated from the program, I've never actually been to the campus. It's possible that the stars haven't aligned for a visit, or it could be that my colleagues at Lyme, who visit regularly, fear that I'll say something crazy and damaging to Lyme's reputation among the next generation of conservation leaders – I'll let you be the judge. Regardless, I'm honored to be here and look forward to a lively discussion.



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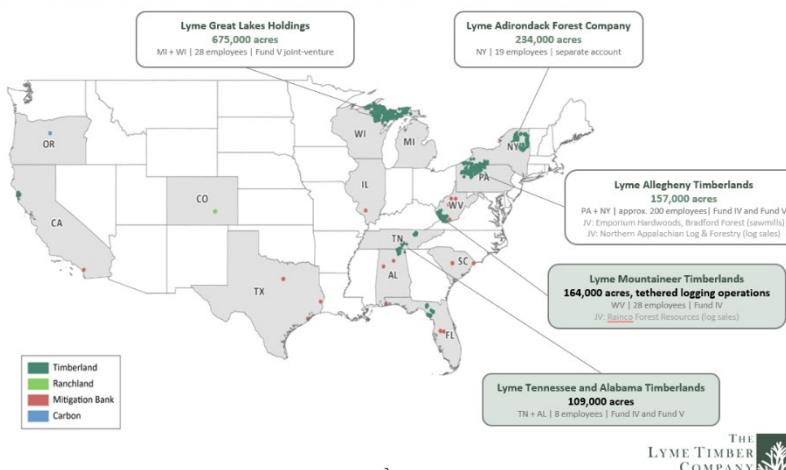


You Get What You Pay For, Part II: A Timberland Investor's Evolving Perspective on Forest Carbon Offsets

Jim Hourdequin, Managing Director and CEO, The Lyme Timber Company
Presentation to the Yale Forest Forum
October 27, 2022

THE LYME TIMBER COMPANY PORTFOLIO

Carbon agreements cover over 200,000 acres of Lyme's 1.3-million-acre portfolio; the lands produce over 100 million feet of sawtimber per year and support 2 sawmills, 3 company logging crews, and hundreds of forest-related jobs in rural communities



Let me start with a little background on The Lyme Timber Company. Our 1.3 million-acre forestland portfolio is built around five businesses, all of which include significant naturally regenerating forests. Although we've owned natural forests in California, Florida, and the Pacific Northwest, our current portfolio is spread across the Eastern US, and includes oak forests in the Appalachian region, and northern hardwoods in the Northeastern and Lake States regions.

Because our portfolio includes forests that are important for conservation, we are active in both traditional land conservation efforts (principally working forest conservation easements) and forest carbon offset markets. In just the last

three years, we've sold over \$50 million of compliance offsets from five different projects on 200,000 acres of our portfolio.

I'm going to try to cover five things in this talk before we get to questions. First, I'll describe expectations for carbon offset market growth that we hear within timberland investment circles and the broader conservation community. Next, I'll recap some of the recent criticisms of forest carbon offsets in the popular press and beyond. Then I'll discuss the work we've done to evaluate the true cost of making management changes – specifically harvest reductions and rotation extensions - that would increase carbon storage on large timberland properties. Fourth, I'll talk about why increasing carbon storage on managed forestlands may not actually be the most effective way of fighting climate change; and finally, I'll describe where I think the forest sector needs to put greater emphasis if we are to make real and lasting contributions to climate mitigation.

Before I begin, I'd like to stipulate that my experience is largely limited to carbon markets in the US, which to date have been dominated by Improved Forest Management (IFM) projects under the regulated California Air Resources Board (ARB) protocol. More recently, we've begun exploring the voluntary markets, which many believe will experience significant growth over the next few years. As I will discuss, I am less confident that these markets are delivering real climate value. This makes me skeptical of some of the more aggressive growth projections, especially with respect to improved forest management projects on existing working forestlands. However, these doubts do not extend to carbon offset markets more generally, as my experience is limited to IFM projects and I have no experience with carbon projects outside the US. And I certainly appreciate the potential for offset markets to help conserve threatened forests and to finance afforestation and reforestation in the tropics and other regions that have experienced forest loss in recent decades.

The conventional wisdom is that forest carbon offset markets will experience tremendous growth over the next several years. While no one expects offsets to be the primary source of climate mitigation, many believe that nature-based solutions will be a critical component and near-term bridge solution for companies that cannot achieve net zero through emission reductions alone.

AN EVOLVING PERSPECTIVE ON FOREST CARBON OFFSETS

Agenda

I. My talk

1. Expectations for carbon offset market growth from carbon developers and the conservation community
2. Recent criticisms of forest carbon offsets in popular press and beyond
3. The true cost of management changes that increase carbon storage on US timberlands
4. Is increasing carbon storage on managed US timberlands an effective way of fighting climate change?
5. Some thoughts on where the forest sector can focus its energy to achieve the greatest climate good

II. Questions and Discussion



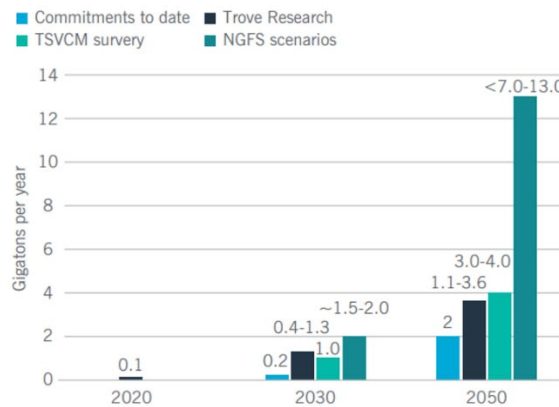
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Some studies estimate that over one third of climate mitigation will come from land-based projects, and forestry projects have accounted for the vast majority of these offsets to date. The volume and value of voluntary market offsets more than doubled from 2020 to 2021, and several analysts have forecast that the market could accelerate from here, resulting in higher offset prices and potentially transforming forestry investment in the US and beyond.

FOREST CARBON OFFSET MARKETS IN THE US

Expectations for demand for forest carbon offsets is forecasted to grow significantly

Figure 3: Estimates of voluntary demand for carbon credits



Source: Nuveen Natural Capital; An introduction to carbon markets for land-based investments. June 2022



At the same time and despite what appears to be growing interest in investing in forestland as a natural climate solution, there have recently been several high-profile criticisms of forest carbon offsets. Articles in the popular press and critiques by watchdog groups have questioned whether compliance and voluntary market transactions have accomplished their purpose to take carbon dioxide out of the air and thereby offset carbon dioxide emissions elsewhere. A Bloomberg article pointed to The Nature Conservancy's selling of offsets on lands that were unlikely to be harvested due to their conservation status.

RECENT CRITICISM OF FOREST CARBON OFFSET PROJECTS

Forest carbon offsets are under scrutiny from all sides



Have carbon markets paid the landowner to "not do what they were not going to do"?



Just a few months ago, the comedian John Oliver ran a segment that took the entire carbon offset industry to task, pointing out its many inconsistencies and highlighting projects that delivered little or no climate benefit. Much of this criticism questioned the "additionality" of offset projects and whether the projects required real changes in behavior, rather than simply quantifying theoretical carbon sequestration gains against hypothetical scenarios that are unlikely to occur.

And an honest assessment of many other carbon projects, including some that Lyme has developed, is that while legal and fully compliant with the protocols, they may not have required the forestland manager to reduce near-term harvest levels relative to historical harvests or change management practices to increase carbon sequestration.

Historically, we approached carbon the way most landowners have: carbon developers came to us with carbon assessments, then we considered the tradeoff between the upfront initial issuance payments and the ongoing obligations under the proposed project. In some cases where the upfront payments were large and the impact on future harvest levels relatively small, we decided to proceed with the project; in other cases, the economics simply did not work, and we decided to pass.

In 2021 we decided to approach carbon offsets from a different angle. Instead of thinking about how to maximize offsets under the rules of a given carbon protocol, we focused on how we could significantly increase carbon storage on properties we own.

Essentially, we modeled harvest reductions and rotation extensions relative to our existing, planned operations – our own, internal baselines. We then calculated the financial impact of implementing those changes over a 40+ year compliance period in the voluntary market, and translated this cost into a price per ton for carbon removal and emission reductions.

We conducted these analyses on our lands in Michigan, Florida, and West Virginia.

RECENT CRITICISM OF FOREST CARBON OFFSET PROJECTS

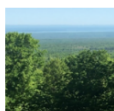
What happens if you start with management changes, then calculate the carbon price?



CASE STUDIES FROM THE LYME TIMBER PORTFOLIO

On three properties, we calculated the present value of long-term harvest reductions and other management practice changes relative to existing operations

Michigan
unencumbered
timberlands



Florida
easement
encumbered
timberlands



West Virginia
carbon
encumbered
timberlands



Assumptions

- **15-33% harvest reductions** relative to current and historical levels
- Stocking levels maintained for **40+ years**
- Only included offsets from **additional** carbon sequestration relative to actual planned harvests
- Offsets reduced by **48-58% for leakage and buffer pool** contributions
- Reduced land sale income where applicable

Results

- Our additionality requirements resulted in **less than half the offsets** than could be realized under compliance and voluntary protocols
- With a lower "Q" and fully loaded costs of harvest reductions and management changes, **our "P" for carbon was high ...** and substantially out of market



Our conclusions – which I presented at the annual Who Will Own the Forest conference on forestland investment last year, and which were reported in the Bloomberg article that some of you may have seen – were that the current price of carbon does not compensate for, or incentivize, immediate behavior changes that would result in greater carbon storage on commercial timberland in the US. Our assessment is that many forest carbon offset projects in the US have probably

delivered relatively little carbon storage and climate benefit. While our commercial forests do store a lot of carbon, and some have and will continue to accrete carbon (because growth is greater than removals), these climate benefits are likely to be realized whether or not the property is enrolled in a carbon offset project. In the US, it can be argued that carbon markets have paid landowners to “not do what they were not going to do”.

Based on our calculations, the price of carbon would need to be much higher – between \$30 and \$60 per ton – to incentivize the kinds of management changes that could result in actual carbon removals and greater carbon storage relative to realistic baseline scenarios. This wide range of carbon prices is dictated by individual property features, including the value of wood products, demand for land sales, and any encumbrances on the property, such as a conservation easement, that may have already extinguished certain option values.

RECENT CRITICISM OF FOREST CARBON OFFSET PROJECTS

The current price of carbon does not incentivize behavior changes that would result in greater carbon storage on commercial timberland

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I noted that although they have not had to change near term management practices to sequester and store more carbon, the landowners who have enrolled properties in carbon projects have, by and large, not extracted rents from the market. Instead, they have been compensated for encumbering their properties with 40 and 100 year agreements that do protect the land and result in several biodiversity and climate benefits. On the properties we have enrolled in carbon projects, we have had to reduce the size of clearcuts, maintain third party forest certification, and give up the right to sell off retail land parcels. These obligations represent real costs and they result in real conservation benefits, even if they don't result in greater carbon sequestration and carbon storage.

I have said that purchasing carbon offsets is like walking into a beer hall for a pint of beer, but being served a fine meal instead. Not surprisingly, John Oliver came up with a better analogy: it's like if you ask your husband to pick up the kids at school and he comes home childless, but with a pizza. You're not mad at the pizza, but he didn't do what you asked him to do. In the world of improved forest management offsets, I think we've conflated climate benefits with pizza and beer.

Conservation NGOs, policy makers, and many in the carbon offset industry have given forestry projects a pass on meaningful carbon removal and climate mitigation because the projects have protected forests and delivered real conservation benefits.

RECENT CRITICISM OF FOREST CARBON OFFSET PROJECTS



Carbon Offsets: Last Week Tonight with John Oliver (HBO)

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Since my Who Will Own the Forest talk and the Bloomberg article, we have continued our work to evaluate the true cost of increasing carbon storage on existing commercial forestlands. On our Florida plantation timberlands, for example, we constrained our harvest optimization models with the requirement that standing carbon stocks increase by 60% over a 10 year period and then remain at this level for 40 years thereafter. This more detailed work supported our earlier analysis that the price of carbon needs to be well above its current levels to both incentivize project enrollment and management changes that increase carbon storage.

FLORIDA TIMBERLANDS: HARVEST REDUCTIONS AND ROTATION EXTENSIONS

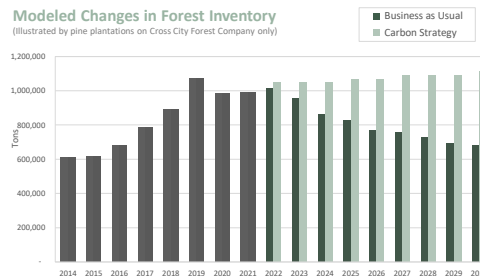
Management Changes:

- 30% harvest reduction (35,000 tons/ year) from current and historical
- Extend rotations from 26 to 31+ years
- Forego right to reduce stocking below current levels

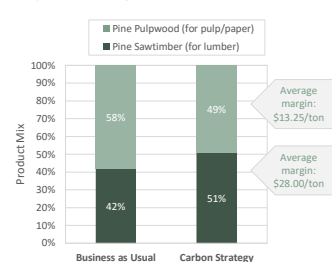
Carbon Storage Benefits:

- 63% increase in year 10 standing carbon relative to baseline
- Product shift to longer-lived solid wood products
- 40+ year commitment

Modeled Changes in Forest Inventory
(Illustrated by pine plantations on Cross City Forest Company only)



Expected Change in Product Mix



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Importantly, our more recent work has also pointed to some additional challenges facing Improved Forest Management (IFM) projects on commercial forestland, which I'd like to briefly describe. I've grouped these challenges into three sets of problems:

- 1) The leakage problem;
- 2) The significance problem; and
- 3) The capital efficiency problem

FOREST CARBON OFFSET MARKETS IN THE US

Additional Challenges facing Carbon Markets in the US

1. Leakage Problem
2. Significance Problem
3. Capital Efficiency Problem

Leakage is the concept of harvest reductions on one property resulting in increased harvests somewhere else, with the result that there is no net increase in carbon storage. The compliance and voluntary market protocols have adjustments for leakage – 20% in the California compliance market and 30-40% in the voluntary markets. But critics have argued that leakage rates may be much higher – potentially as high as

95-100% over the short term on managed forestlands. Wood fiber and wood products are global commodities and harvest reductions in the US may well increase harvesting in other parts of the world, potentially in regions with fewer environmental protections. On a more micro, localized level, we know that pulp mills and sawmills are fixed cost businesses with large procurement zones, and over the short term, they are not going to change their consumption patterns in response to harvest reductions on any one land base.

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The second problem is what I call the “significance problem”, and by this I mean the absolute amount of additional carbon storage that results when you utilize an appropriate baseline and properly account for leakage. On our Florida property, we modeled a 60% increase in standing carbon over a 10-year period, but despite this significant management change, after accounting for leakage and our realistic business as usual baseline, we generated fewer than 0.5 offsets per acre per year over the first 20 years of the project. By my rough calculations, it would take management changes on over 400 acres of the Florida lands to equal the carbon removal benefits that would result from installing solar panels on just one acre. In short, it’s hard to see how management changes that increase carbon storage on current industrial timberlands – when properly accounted for - are going to move the needle on climate.

The third problem is a little less exciting and follows from the first two: it’s the idea that it’s not particularly efficient from a capital allocation standpoint to invest in carbon sequestration on commercial timberlands. If you are going to buy the land and timber, the amount of climate benefit per dollar of investment just isn’t that great, unless you make unrealistic assumptions about what would have happened to the forest in the absence of the carbon project. Investing in commercial timberland for the sole purpose of sequestering more carbon is like buying a skyscraper so that you can put a few solar panels on the roof.

So what does all this mean for nature-based solutions, land conservation, and the future of forest carbon offsets in the US? One observation is that there appears to be a growing fatigue within the conservation and scientific community with forest carbon offsets. I attended the Trillion Trees US chapter conference earlier this year, and heard several conservation leaders lamenting the fact that efforts to increase biodiversity, water quality, and land rights all need to be framed through the lens of carbon offsets as “co-benefits” if they are to garner corporate funds that are dedicated to net zero commitments.

Perhaps we need to move away from carbon offsets to something much broader – for example, a “nature credit” that makes fewer claims about carbon removal and better incorporates the many co-benefits of conserving land.

Alternatively, we could renew our commitment to regulations and legal instruments that conserve land. In the US, we have for decades utilized working forest conservation easements to secure multiple public benefits – water quality, biodiversity, public recreational access, older forests, and even carbon storage – from forests. The Inflation Reduction Act adds a record amount of federal funding – over \$700 million over the next 5 years – for the Federal Forest Legacy program, a well-established funding scheme for conservation easements that already provides \$90 million per year for forestland conservation. My

FOREST CARBON OFFSET MARKETS IN THE US

Conclusions and Implications for the BioEconomy

1. Carbon offset fatigue
2. Nature credits or a return to “traditional” conservation tools
3. Greater emphasis on bioeconomy: wood as a substitute for more carbon dioxide intensive materials
4. Importance of non-commercial thinning to mitigate climate and environmental health impacts of fire

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hope is that these sources of funding for land conservation will enable the conservation community to be more clear-headed about the real climate benefits of IFM carbon projects in the US.

Returning to carbon storage: there is great potential for climate benefits from wood uses that displace more CO₂ intensive materials. Mass timber buildings, new uses of wood for packaging, insulation, and other materials – alongside traditional uses of wood for furniture, flooring, and buildings – all present opportunities for carbon storage and for the displacement of more CO₂ intensive materials.

Where applicable and based on sound science, wood industries need to do a better job of documenting – but not overstating – the climate benefits of wood relative to alternative materials. At Lyme Timber, we've been supporting research into hardwood cross laminated timber, and we're excited that some of the leading

companies who have made climate pledges – including Microsoft, Walmart, and Amazon – are exploring how they can utilize and incentivize greater use of wood in construction.

While it's exciting to think about commercial markets for wood, we also need to think about thinning forests to reduce fire risk, even when we don't have markets for the harvested wood products. Biochar and biomass markets have gotten a lot of attention, but in many regions these markets may not be scalable businesses, and their carbon footprint may not be particularly good. We've been working with researchers at the Yale Carbon Containment lab to explore ways to harvest dead or fire-prone trees and then bury them or pile them on site in ways that minimize decomposition and thereby maximize carbon storage. As I noted in a recent testimony to the Senate Energy and Natural Resources committee, developing harvesting systems and a workforce to perform this work will be critical to our success in mitigating the climate and environmental health impacts from fire on western US forests.

And that brings me to the end of my remarks. To summarize, I remain skeptical that forest carbon offset markets will live up to the expectations that many have set for them in the US – the price is way too low to drive real behavior change, leakage is a real issue, and when you set realistic baselines, it turns out that harvest reductions and changes to forest management practices on commercial timberlands in the US may not be the most efficient way to mitigate climate change. A better solution may be finding more ways to substitute wood products for materials whose production is more CO₂ intensive while also renewing our commitment to traditional land conservation and investing in forest restoration and fuel load reduction in the western US and beyond. Thank you. [End]

FOREST CARBON OFFSET MARKETS IN THE US

Conclusions and Implications for the BioEconomy

1. Carbon offset fatigue
2. Nature credits or a return to “traditional” conservation tools
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