Concept Paper: Exploring the Potential Effects of an Expanding Forest Carbon Market on Working Forests and Communities in the United States

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Introduction

This concept paper explores the potential effects of an expanding forest carbon market on working forests and the communities that rely on them in the United States. From an economic perspective, the paper considers potential impacts on access to raw materials for traditional forest-based economic activities and the diverse products that forests provide throughout homes and businesses. From an ecological perspective, the paper considers forest biology, associated climate mitigation capacities and risks, the many diverse habitats forest provide, and their essential role in supporting biodiversity. Finally, from a social perspective, the authors raise the potential effects of carbon markets on the needs and values of local communities, employment and household incomes, state and local tax revenues, and associated quality of life considerations.

The intent of this paper is to provide a starting point for inviting further dialogue. The outlined ideas will inform a survey of stakeholders and interested and affected parties, contribute to design of a mapping tool addressing geographic influences on carbon market impacts, and culminate in a workshop to be held in mid-2024. At the workshop, presenters and participants will further explore the current state of forest carbon markets in the United States, what is working well for forests and people, and what changes are needed to ensure all forest products, services, and values can continue to be available for current and future generations.

Key questions raised in this paper include:

- Where there are forests with overlapping objectives, are there existing or potential conflicts in value attainment, and what tools can be developed to help identify competing priorities and balance trade-offs?

- Are the existing forest carbon offset protocols sufficient to ensure rural communities and biodiversity are appropriately addressed in the design and implementation of forest carbon projects?

- Are we missing opportunities to share perspectives, elevate awareness, and integrate critical thinking (and action) among the full spectrum of stakeholders?

Background

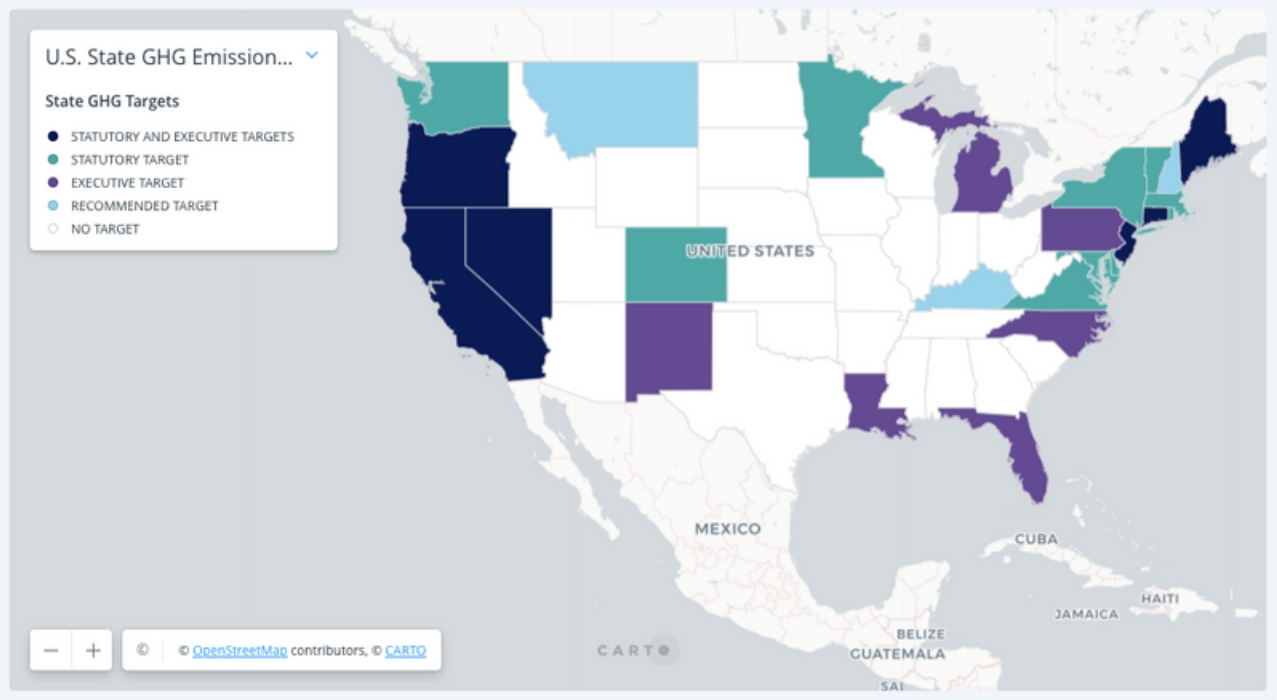
According to the US National Aeronautics and Space Administration (NASA) “the effects of human-caused global warming are happening now, are irreversible for people alive today, and will worsen as long as humans add greenhouse gases to the atmosphere.” The UN Intergovernmental Panel on Climate Change (IPCC) says "the scientific evidence is unequivocal: climate change is a threat to human wellbeing and the health of the planet. Any further delay in concerted global action will miss the brief, rapidly closing window to secure a livable future." Annual greenhouse gas (GHG) emissions from 2010 to 2019 were the highest on record, averaging 54.4 gigatons of CO2 equivalent (GtCO2e) (UNEP, 2022). The US World Meteorological Organization reported another record high for GHG emissions in 2022. Atmospheric concentrations of carbon dioxide are now 50% higher than pre-industrial times with CO2 levels the Earth has not experienced for over 3 million years (WMO, 2023). In the US, most greenhouse gas emissions (76%) are from burning fossil fuels for transportation, electricity production, and industrial sectors (EPA, 2023). Since 1990, Land Use, Land-Use Change, and Forestry (LULUCF) activities in the US have resulted in more removal of CO2 from the atmosphere than emissions and, the LULUCF sector in the US is considered a net sink, rather than a source, of CO2. In other regions of the world, including countries where forest land is being converted to agricultural uses such as grazing and crop production, the LULUCF sector can be a net source of greenhouse gas emissions (EPA, 2023).[1]

Negotiated under the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement is a legally binding international treaty ratified in 2015 by 196 countries to combat climate change. The agreement sets “well below” 2° Celsius as the upper limit for global warming, with 1.5° C as a preferred goal to avoid the most severe climate change impacts in most of the world. The IPCC now uses 1.5° C as a target in its reports (MIT, 2023). According to the World Resources Institute (WRI), to date 177 countries have submitted formal national pledges with specific contributions for reducing GHG contributions. A total of 89 countries, representing 86% of global emissions, had adopted net-zero commitments by the end of 2022 (Net Zero Tracker, 2023).

As a signatory to the Paris Agreement, the US has submitted a “nationally determined contribution” (NDC) of reducing economy-wide GHG emissions by 26% below 2005 levels by 2025, and by 50% by 2030 (UNFCCC, 2021). The US Department of Energy (DOE) announced that 90 organizations had also pledged to reduce their emissions by at least 50% by 2030 (DOE, 2022). Additionally, according to the Center for Climate and Energy Solutions (C2ES), 24 US states have adopted GHG emission reduction targets (CCES, 2023a). These state level actions include economy-wide targets established through statutory action (e.g., legislation), executive action, or recommendations (Figure 1).

1 Additional information about emissions and changes to atmospheric conditions is available in the most recent US report on GHG emissions as well as the UN 2023 Emissions Gap Report, the Global Carbon Budget, and the website for EPA GHG Emissions.

Figure 1. US State GHG Emission Targets, 2023.



Source: [CCES, 2023a]

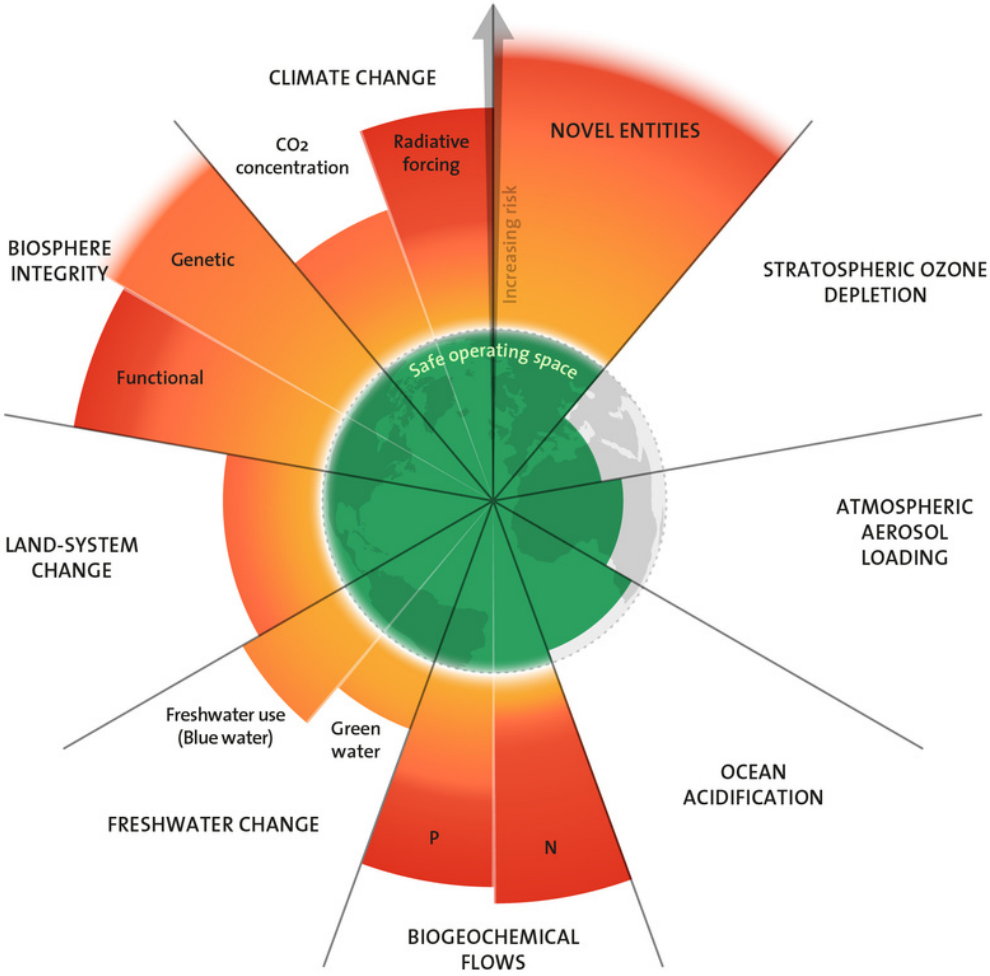
Despite these pledges, the cumulative impact of current climate policies is not nearly enough to achieve the stated goals of the Paris Agreement (World Bank, 2023). According to the United Nations Environment Programme (UNEP) 2022 Emissions Gap Report, "incremental change is no longer an option" for limiting global warming to below 2° Celsius and to avoid catastrophic climate change (UNEP, 2022). Furthermore, countries are considerably off track to achieve even the NDCs, which are projected to fall short of stated goals. Under current policies, and with additional actions pledged by the signatories of the UN Paris Agreement, global warming is projected to reach 2.4°C by 2100. To limit global warming to 1.5°C, global annual GHG emissions will need to be reduced by 45% from current emissions in just eight (now seven) years, and continue to decline rapidly after 2030, to avoid exhausting the limited remaining atmospheric carbon budget. To stay below 2°C, emissions would need to be cut by 30% (UNEP, 2022).

According to the UNFCCC Secretariat, climate change is the most pressing of three interrelated issues that collectively represent a "triple planetary crisis" currently facing humanity. The other two issues, pollution and loss of biodiversity, present significant challenges as well. The annual displacement of over 20 million people is both a cause and effect of socio-political instability and conflict resulting from climate change and related human suffering (UNFCCC, 2021). A report by the Swiss Re Institute projects an 11% loss in global GDP by 2050 with a 2 degrees Celsius increase in average global temperatures. Biodiversity loss affects ecosystem health, food supplies and access to clean water (Swiss Re, 2021). Tangible action by both public and private sectors to combat these issues is crucial.

The planetary boundaries framework developed by the Stockholm Resilience Centre identifies nine biophysical processes that together regulate the stability and resilience of the Earth's biosphere (Richardson et al., 2023). The framework further establishes safe operating boundaries for each of these nine processes. Exceeding these thresholds materially increases the risk of catastrophic and irreversible harm to people and global ecosystems.

A fundamental theme of the planetary thresholds framework is that these planetary processes are interdependent and must be considered comprehensively, and to focus exclusively on one singular resource objective puts others at risk. Two-thirds of these planetary boundaries have been breached, meaning we are now outside Earth's "safe operating space" relative to those processes. One-third of the planetary processes - climate change, biodiversity, and land use change - are central to the question of how forests are managed to simultaneously meet social, economic, and environmental needs, and all of these have been surpassed (Figure 2) (Richardson et al., 2023).

Figure 2: Current Status of Nine Planetary Thresholds



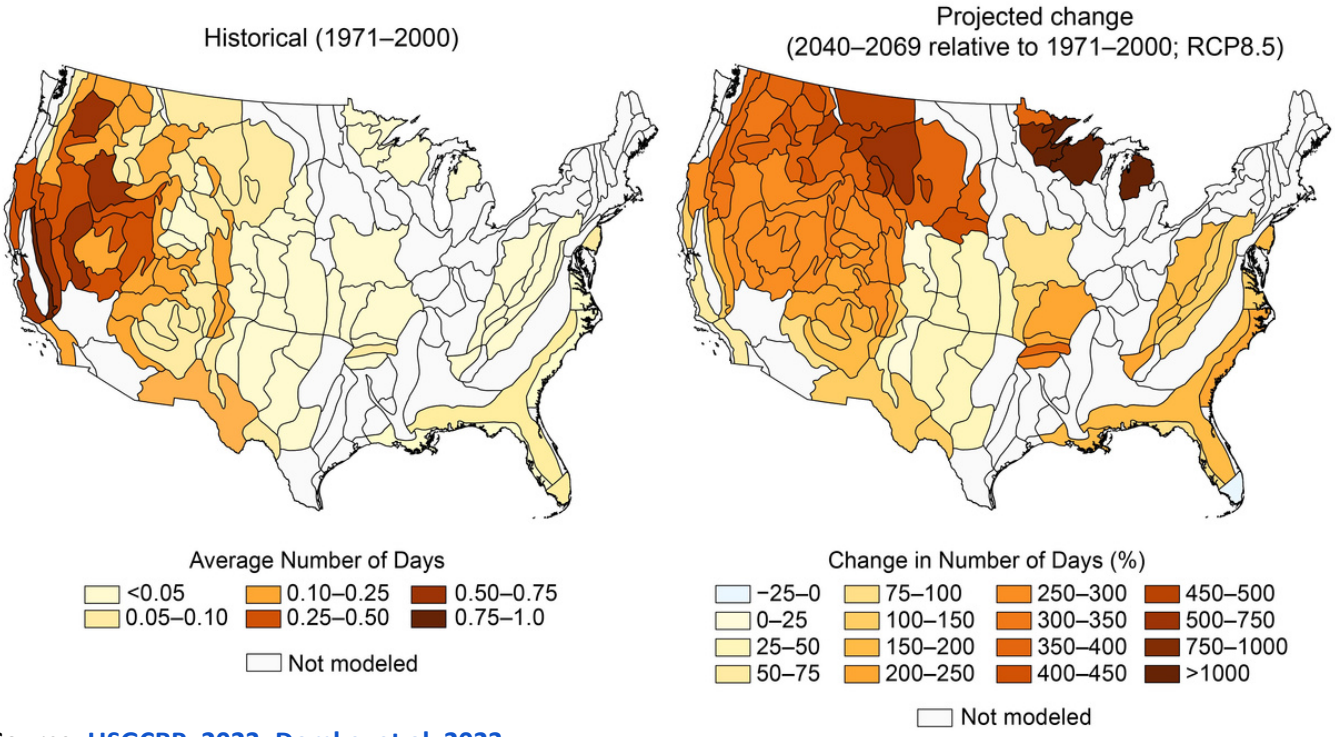
Source: Richardson, et al., 2023.

Potential Impacts to Forest Communities, Products, and Services

The forest and wood product sector supports livelihoods and cultural identity within hundreds of communities throughout the US, particularly in rural, forested areas. Suburban and urban communities are also the locations for significant secondary manufacturing, finished goods production, distribution, and company operations. In addition to economic contributions through jobs, purchasing, and payment of state and local taxes, the sector contributes to the production of a wide range of forest products, services, and values. Forests and the wood products sector are vital to achieving at least five of seventeen UN Sustainable Development Goals (SDGs): SDG 6 Clean Water, SDG 8 Decent Work, SDG 12 Responsible Production, SDG 13 Climate Action, and SDG 15 Life on Land (Lippe et al., 2022). As private and public climate pledges and related investments continue to increase in both number and scale, so will the effects on forests, forest product markets, and forest-dependent communities. According to Forest2Market's 2022 predictions for the forest industry, "the question is no longer a matter of 'if' carbon will hit manufacturers' bottom lines, but 'when' it will hit" (Stewart, 2022).

Forests are also at risk due to climate change, including the increasing occurrence of natural disturbances (USGCRP, 2023). For example, the conditions that are conducive to very large wildfires is projected to double in many regions over the next several decades, with more than a fourfold increase for parts of the Northwest, fivefold for the northern Rockies, and over sevenfold for the Upper Midwest (Figure 3) (Domke, et al, 2023).

Figure 3. Projected increase in conditions conducive to very large fires.



Source: [USGCRP, 2023; Domke, et al, 2023.]

Forests provide considerable social and economic values for sustaining rural communities. The absolute and relative importance of forestry's economic contribution varies considerably by state and geographic region. However, throughout the US there is a strong predictive relationship between rural labor force and economic contribution from forestry (Pelkki & Sherman, 2020).

A 2019 study by Forest2Market found that forest businesses provide over 1.2 million jobs in the US with over $55.4 billion in direct wages. When including indirect and induced impacts, the sector supports 2.9 million jobs and $128.1 billion in total payroll. The paper, wood and furniture manufacturing industries contribute nearly 6% of the US manufacturing gross domestic product (GDP), ranging from 6.7% in the South to 3.6% in the Northwest region.[2] In nearly one-third of states evaluated (10 of 32), these forest products industries represent more than 10% of state manufacturing GDP, with the highest rates found in Maine (20.4%), Arkansas (16.7%), and Mississippi (14.9%) (Forest2Market, 2019).

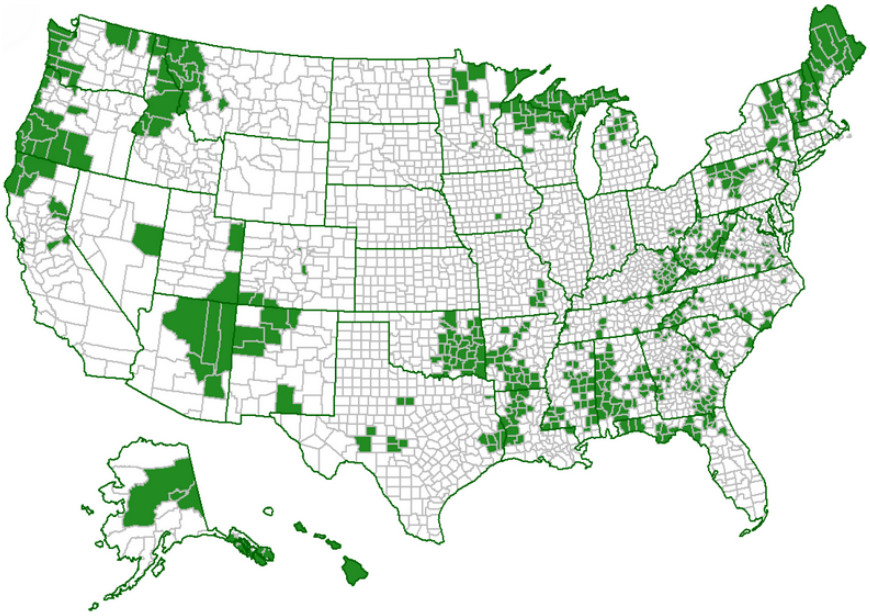
A separate study completed in 2021 found that the economic recovery of historically timber-dependent counties in the Western US varies substantially following the loss of a major employer such as a lumber mill (Rasker, 2021). While some have recovered, others have not and continue to struggle as the ability to create new jobs has been difficult for some communities (Rasker, 2021; Haynes, 2003). Forest dependent communities tend to exhibit lower levels for most measures of resilience when compared to other communities (Frey, 2021).

2 For more information, including the regional definitions, see the full article here.

As such, communities that depend on forests for their livelihoods and quality of life may be less capable of successfully adapting to abrupt social and economic change, and therefore particularly vulnerable to job curtailments in the forestry sector.

There are over 3,400 counties in the US. A 2022 study identified 524 counties, or 16.7% of all counties as meeting social, environmental, and economic criteria for defining forest dependent communities. The highest concentrations of forest-dependent counties are in the Pacific Northwest (33.0%) and the Southeast (24.4%); however, these communities are generally found throughout the US in all timber producing regions (Figure 4) (Frey, 2022).[3]

Figure 4. Forest-dependent communities in the US.



Source: Frey, 2022.

In the US, there are approximately 823 million acres of forest and woodland area, which comprise over one third of the landscape and contain 1 trillion cubic feet of wood volume (Oswalt et al., 2019). About 56% of the forest area in the US is privately owned (Oswalt et al., 2019). Privately owned forestland provides 88-90% of the total annual timber harvest in the US (CRS, 2019). All 50 US states have programs in place that reduce property taxes for forest lands in exchange for landowner commitments to manage their land sustainably. Over half of the states require a written forest management plan, and production of timber is stated or inferred in many state 'current use' programs (Kilgore et al., 2018). Participation in forest carbon projects may conflict with some state current use programs.

3 For regional breakdown, we utilized the USDA Forest Service Resource Planning Act Assessment definitions for subregions by state as follows:
1. Northeast: CT, DE, DC, ME, MD, MA, NH, NJ, NY, OH, PA, RI, VT, WV
2. North Central: IL, IN, IA, MI, MN, MO, WI
3. Southeast: FL, GA, NC, SC, VA
4. South Central: AL, AR, KY, LA, MS, OK, TN, TX
5. Great Plains: KS, NE, ND, SD
6. Intermountain: AZ, CO, ID, MT, NV, NM, UT, WY
7. Pacific Northwest: AK, OR, WA
8. Pacific Southwest: CA, HI

Currently, most forest carbon methodologies that apply to existing forests are designed to use reduction, deferment, or exclusion of harvesting activities to increase carbons stocks relative to a counterfactual baseline scenario that would in theory occur in the absence of carbon finance. In other words, a fundamental requirement of a forest carbon project - additionality - is to sequester and store more carbon in the forest than would otherwise have happened without the project. While many forest product companies and landowners are strategizing around carbon markets and using it within their toolkit that includes continuing to meet their timber harvesting objectives, conflict has begun to develop at the state and local levels in response to the acquisition and purchasing of working timber lands by forest carbon project developers. With the objective of enhancing forest carbon sequestration and storage, the new owners may reduce and/or delay timber harvest or make other changes to how the land is managed that will impact local interests. Conflicts are also emerging as carbon prices increase and compete with some traditional forest products. In both West Virginia and New Hampshire, concerns have surfaced about the ongoing viability of lumber mills, impacts to jobs, and loss of tax revenues. The conflict has included legal battles over the regulatory authority of the Environmental Protection Agency, cases before the Supreme Court, and the review by the State Attorney General (Bush & Chow, 2022; Tracy, 2023). Changes in land ownership and management activities can also impact traditional uses, recreation access, and other social and cultural values. Lawmakers in both states are drafting legislation to address issues relating to forest carbon credits, and many states have enacted a variety of climate related policies (C2ES, 2023a).

Government officials, particularly those representing rural districts, are often well-aware of the economic contributions from forestry. However, these same policy makers may not understand that these benefits are co-related to the delivery of a wide range of social and ecological services on a sustainable basis throughout the country (Forest2Market, 2019). Also, carbon markets are still evolving and the opportunities can be confusing to landowners and decision makers. Experiences with unclear or conflicting information about carbon markets, the options available, and the potential benefits can contribute to perceptions of risk and uncertainty that may also increase conflicts.

Link to Biodiversity and Forest Health

The 2019 Global Assessment report on Biodiversity and Ecosystem Services produced by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) concluded that biodiversity is declining faster than ever, and the rate of species loss continues to accelerate, with 1 in 8 existing species now at risk of extinction (IPBES, 2019). According to NatureServe, in total, 21,715 native species are known to exist in the US. Fully 80%, or 17,464 of them, are associated with forest habitats (NatureServe, 2023). Among forest-associated species in the US, 31% were determined to be at risk of extinction (i.e., critically imperiled, imperiled, or vulnerable to extinction) (Nelson & Knowles, 2022a).

Because forests provide habitat to most US species and sequester and store atmospheric carbon, they are fundamentally crucial to addressing both climate change and the biodiversity crisis. Forests are also increasingly affected by climate change, and associated declines in forest health or other impacts may compromise their capacity to support biodiversity and provide ecosystem services. Decisions about how forests are managed determine not only timber harvest levels, but also the amount and quality of habitat available to support biodiversity, as well as the quantity of carbon stocks sequestered and stored in both temporal and spatial dimensions.

Consequently, there is increasing interest in "developing management approaches that simultaneously support biodiversity, provide wood products, and optimize climate mitigation benefits. Yet, the actions needed to halt biodiversity loss may differ from those required to mitigate climate change" (Asbeck et al., 2021). Furthermore, landowner objectives, land tenure and use rights, forest composition, site characteristics, and other factors influence management priorities and/or limit options. As such, it may not be desirable, or possible, to optimize all values on a single forest tract. It is also likely, however, that climate, economic, and biodiversity objectives can be compatible across a range of forest conditions and available management options.

Several studies have been conducted to shed light on the interrelationships between forest management intensity, biodiversity conservation, and carbon stocks. While this area of study requires further development and research results vary, there are some common themes. Relationships between species richness, management intensity, carbon stocks in trees, and site productivity are variable depending on site characteristics. As such, there is a high degree of flexibility within forest management approaches to achieve biodiversity and climate mitigation objectives.

Harvest level has a strong influence on carbon stocks and fluxes, while biodiversity can be more dependent on other management variables. Variability in the spatial distributions of carbon and biodiversity values can present a range of options for increasing carbon stocks, yet many attributes of biodiversity can be more locally confined. In this context, while declines in carbon stocks due to harvesting may be temporary, local biodiversity values may be permanently lost (Asbeck et al., 2021).

Significant stakeholder interest in biodiversity conservation is evidenced by the 277% increase in volume (17.4 MtCO2e to 65.9 MtCO2e) from 2020 to 2021 of VCS carbon credits sold with Climate, Community & Biodiversity (CCB) as an add-on standard. (Forest Trends, 2022.) At the same time, carbon finance has recently invested in reforestation projects of genetically modified trees engineered to maximize carbon sequestration with the overarching goal of aggressively combating climate change (e.g., start-up company Living Carbon). A recent update to the VCS Standard included a prohibition of introduction of non-native monoculture plantations. However, a revision to the update that would allow the introduction of non-native monoculture plantations with certain sidebars is currently open to public comment. The revised VCS Standard also includes requirements for protection of ecosystem health prohibiting negative impacts to biodiversity and adverse impacts to habitats for at-risk species. ACR requires reporting on contribution to UN SDGs, but there are no specific requirements for consideration of biodiversity.

Outside the carbon crediting sector, there are a number of global initiatives to promote consideration of biodiversity in corporate strategies. Examples include:

- COP15: Kunming-Montreal Global Biodiversity Framework (GBF),
- Taskforce on Nature-related Financial Disclosures (TNFD) Recommendations,
- Network for Greening the Financial System (NCFS), and
- Science Based Targets Network (SBTN).

There may be additional opportunities to emulate these efforts to integrate biodiversity and climate objectives within carbon offset markets and provide support for sustaining a more comprehensive range of forest products and services.

More broadly than biodiversity concerns, forest health and resilience are also affected by forest policy and market-based instruments that influence the way forests are managed. Forest carbon offset methodologies that result in decreased and/or deferred harvest, or indirectly limit silvicultural practices designed to reduce tree stocking and or fuel levels, can lead to increased risk of wildfire, insect infestations, and reduced diversity in habitat. In other words, there may be instances where increasing forest carbon stocks in the near term (as incentivized by offset markets) and maintaining long-term forest health are in conflict. There have been some developments outside the carbon offset market to deliberately align long-term and short- term objectives for forest health and climate change. One example is the Reduced Emissions from Megafires (REM) methodology developed through the Climate Forward program administered by the Climate Action Reserve (CAR). Climate Forward projects don't generate offset credits, but they do provide a mechanism to facilitate investment in projected reductions in GHG emissions. There is space for further development within the carbon crediting programs to more deliberately incorporate forest health considerations within forest offset methodologies.

The challenges posed by climate change, land-use change, and biodiversity loss are deeply interconnected and integrated solutions are needed. Without equal consideration of biodiversity values, forest carbon projects may deprioritize or forego opportunities to conserve or enhance biodiversity. Incorporating biodiversity conservation with climate objectives is important for siting, designing, and implementing forest carbon offset projects (Alam et al., 2023). Further research is needed to refine methods and strategies for implementation of integrated objectives at a landscape scale.

Responding to the Crisis

Climate change is directly impacting society and ecosystems on a global scale, and in the process challenges how we value forests in consideration of their importance for climate mitigation as well as traditional forest products and services, including biodiversity.

With the growing awareness of societal impacts caused by climate change, consumer-facing brands and other corporate entities are increasingly recognizing economic and reputational threats. As a result, there has been a significant rise in corporate climate commitments in recent years. Already, 38% of Fortune Global 500 companies have set a public net-zero target, and this trend has strong momentum (Climate Impact Partners, 2023). Consequently, demand for carbon offsets from voluntary markets has been expanding rapidly and significantly over the past several years. Private companies are increasingly relying on voluntary carbon offsets to mitigate direct GHG emissions, and VCS project registrations increased by 243% from 2021 to 2022 (World Bank, 2023).

According to Net Zero Tracker, the number of companies with net zero targets for GHG emissions has increased by 40% in the 16 months since June 2022 with half of the companies on the Forbes Global 2000 list now having set net zero targets (Talman, 2023). Since 2019, 451 organizations have joined Amazon in signing the Climate Pledge to achieve net-zero carbon emissions by 2040.

As the carbon offset market has continued to grow with increases in corporate climate pledges, the role of carbon credits to mitigate direct emissions has raised concerns of corporate greenwashing (World Bank, 2023). There is a perception from stakeholders that by purchasing offsets instead of making systemic changes, companies may not be doing enough to mitigate actual GHG emissions. Questions have arisen around additionality on forest carbon projects that suggest baseline scenarios used to calculate carbon credits may not credibly reflect conditions that would occur in the absence of carbon finance, and therefore inflate both the volume of credits issued, and the impact of the project on climate mitigation. Offset demand dropped in 2022, largely due to growing criticism, although bottlenecks in credit issuance by registries was also a factor.

Several global initiatives have been formed to address integrity issues and increase accountability in the voluntary carbon market. The Voluntary Carbon Markets Initiative (VCMI) addresses demand-side use of offsets in corporate ESG strategies. The Integrity Council for the Voluntary Carbon Market (ICVCM) works from the supply side by setting standards for quality offset projects. All major independent offset crediting programs have applied for formal confirmation of adherence to ICVCM's core carbon principles and to collaborate in other actions to improve consistency and integrity of credits issued (Verra, 2023). The SBTi limits the emissions that can be offset, and the type of offsets that can be used to improve transparency and accountability for corporations pledging to reduce and eliminate GHG emissions from their operations.

Significant reductions in direct emissions are clearly the priority for mitigating climate change within the IPCC scenarios, and it appears as though companies are adopting strategies that align with that mandate. In 2021, purchases of carbon credits represented an average of only about 2% of corporate total GHG emissions. (Forest Trends, 2022).

Even with increased emphasis on cutting GHG emissions, offsets will be needed to mitigate those that can't be reduced through technical and operational control measures, especially in the short-term (ie., this decade and perhaps through 2050, based on IPCC scenarios). Forests and other nature-based systems are among the most cost-effective near-term options for reducing GHGs. Natural climate solutions can provide up to one-third of the mitigation needed to reach global climate goals by 2030 (World Economic Forum, 2023).

Long-term projections for the carbon offset market continue to reflect expectations for significant growth, and demand is expected to increase dramatically in the next few years. The global offset market is estimated to reach 181 MMtCO2e in 2023 and is projected to expand to 1.2 billion metric tons (GtCO2e) by 2030. Voluntary demand from companies remains the primary driver of market activity. (Bloomberg NEF, 2023) The voluntary offset market is projected by some to grow from $2 billion in 2020 to $100 billion in 2030.

To achieve the goals in the 2015 Paris Agreement along with company-level targets, at least 1 gigaton of CO2 will need to be removed each year through 2030, with up to 10 gigatons of avoidance or reduction credits. While technology-based carbon removal projects may gain importance in the long term, nature-based avoidance and reduction credits will be needed at least in the near term (Morgan Stanley, 2023). Natural climate solutions are expected to account for about one-third of the mitigation needed to achieve the global warming target of 2 degrees Celsius (World Economic Forum, 2023).

Historically, buyers have expressed a preference for these nature-based solutions, and forestry and agriculture currently dominate the voluntary offset market. Despite persistent questions about additionality, permanence and carbon accounting, demand for forest carbon offsets is expected to continue to grow along with the market. In the last decade, more than 326 million carbon credits have been issued to projects in the United States. Approximately 58% of those credits were issued from forestry projects (USDA, 2023).

The prospect of significant growth is attracting capital investments from a broader range of entities. Alongside policy and market developments, there have been significant investments in adapting and creating technology-based solutions for increased transparency, efficiency, and access to carbon markets. The development of complex analytical capabilities incorporating remote sensing technology, satellite imagery machine-learning, blockchain and customized software have significantly enhanced the overall capacity and competence of the forest carbon offset market. As a result, according to one estimate, investments in upstream credit generation increased by 40% from 2021 to 2022, representing over $10 billion. The number of project developers and verification bodies has also increased. Some would argue that these advancements have also contributed to maintaining a narrow focus on trees and carbon storage at the cost of a more comprehensive approach that includes social and other conservation values like biodiversity (World Bank, 2023).

Despite falling in 2022, prices are anticipated to rise over the next two years. Futures contracts indicate that prices will increase modestly over the next few years (World Bank, 2023). Offset prices are projected to climb to anywhere from $18/ton to over $250/ton by 2050 depending on market acceptance and preferences around project types and quality of credits (Bloomberg NEF, 2023). The volume of “forward transactions” increased by 65% from 2020 to 2021 indicating strong future demand for offsets. Forestry and Land Use accounted for 75% of those credits. Projects that include social and ecological co-benefits carry a price premium. CCB is currently the most common co-benefit add-on for VCS credits. Volume of credits traded with a CCB add-on increased by 277% from 2020 to 2021 (Forest Trends, 2022).

Discussion

Increased demand and higher prices have sparked a surge in investment and innovation in the 'infrastructure' of the carbon offset market. Advances in technology (remote sensing, satellite imagery, artificial intelligence, software applications), new developments in methodologies for measuring and calculating carbon, and emergence of new service models have lowered barriers to participation for smaller forest owners and other market participants, thereby increasing the potential footprint of forest carbon offset projects.

At the same time, financial investment strategies are beginning to acknowledge the value of carbon. In 2021, JP Morgan acquired Campbell Global. Although terms were not disclosed, Campbell Global managed 1.7 million acres and $5.3 billion in assets globally. In October 2022, Blue Source Sustainable Forests Company (now referred to as Aurora Sustainable Lands) purchased 1.7 million acres of mostly hardwood forests from The Forestland Group for approximately $1.8 billion. Aurora Sustainable Land is a joint venture between Anew (a leading carbon offset project developer) and Oak Hill Advisors (a subsidiary of T. Rowe Price). These timberlands will be managed principally for climate mitigation. In combination with technological advancements, new financial products and service models are building an enhanced infrastructure for what some expect will be a decade of significant growth.

Offset prices for the voluntary market in the US are now in the range of $12/ton - $15/ton for Improved Forest Management (IFM) projects, and up to $35/ton for some Afforestation/Reforestation (A/R) projects. Prices in the regulatory market are equal to or above those in the voluntary market, and prices are expected to continue to increase into the foreseeable future. Already, forest carbon offset prices are locally competitive with lower value traditional forest products such as pulpwood, and chip and saw logs. As offset prices continue to increase, it's reasonable to anticipate price competition with mid-value forest products in the near future.

All this is good news for forest owners seeking additional sources of income to supplement traditional forest products markets. Given past and current developments, it seems likely that forest owners and investors will continue to engage in forest carbon projects to the extent they remain profitable. Stakeholder perceptions that some existing baseline and accounting methodologies allow timberland owners to sell credits without changing practices, especially harvest levels, has led to the market concerns about the integrity of some credits issued from forest carbon projects. As such, it may be equally likely that methodologies will evolve to close perceived gaps to ensure offsets result in "actual" reductions in harvest levels.

Expansion of forest carbon offset markets could also potentially be good news for biodiversity and sustainable forest management, depending on forest characteristics and how they are managed. Alternatively, reduced and/or deferred harvests and silvicultural interventions could lead to elevated stocking levels that threaten forest health, forest resilience, and habitat diversity.

Downstream from the forest, however, the outlook may be less favorable. As more forest owners commit to forest carbon projects there is concern that, by design, less timber may be harvested, even on sustainably managed forests. Reduced harvest levels could lead to raw material shortages for domestic forest products industries, which in turn can lead to job loss in forest industries, mill closures, loss of tax revenue and decline in rural, forest dependent communities. Alternatively, or perhaps additionally, expansion of forest carbon projects could lead to increases in forest carbon stocks beyond levels conducive for maintaining forest health and resiliency. Already, the US has seen ample examples of unanticipated effects from well-intended policies leading to forest health problems such as increases in catastrophic wildfire and insect infestations.

With increasing emphasis on nature-based solutions, particularly forests, market pressures with divergent uses and valuations of forests can conflict with each other and create tensions between conservation versus utilization as demonstrated in legal challenges to carbon market development in some states (Bush & Chow, 2022; Tracy, 2023). The US Climate Change Litigation database (a joint project of the Sabin Center for Climate Change Law at Columbia Law School and Arnold & Porter) currently includes 1,687 cases with links to 11,114 case documents.[4] Deliberate efforts to identify synergies between market dynamics, policy, and technology to integrate equal consideration of communities, ecosystems, and climate benefits of forests at various scales is a major challenge and essential for avoiding future conflicts, and for ensuring that all forest products and services remain available for current and future generations.

A relatively new term - Climate-Smart Forestry (CSF) - has been introduced to the forestry lexicon to describe a forest management philosophy that incorporates the fundamental linkages between forests, society, and climate. However, there is currently a lack of consensus on how to define CSF, and broad application of the current framework "could result in paltry or even undesirable outcomes for climate, biodiversity, and society" (Cooper & MacFarlane, 2023).

In 2023, there were sixteen forestry offset protocols applicable to the US, with another two under development. Are these options sufficient to ensure rural communities and biodiversity are appropriately addressed in the design and implementation of forest carbon projects?

Offset credits have been issued using only seven of the sixteen available methodologies, with over 190 million credits issued to US forestry projects in the past decade (USDA, 2023). Forest certification may be viewed as a proxy for balancing climate mitigation objectives with other social and ecological values. FSC certification is required of one VCS methodology (VM0003), and forest certification (e.g, FSC, SFI, ATFS) is one of several options (i.e, not explicitly required) for demonstrating adherence to sustainable forest management and leakage requirements for ACR IFM methodologies, the CAR Forest Protocol, one VCS methodology (VM0045) and the CARB Forestry protocol. The Climate, Community and Biodiversity (CCB) standard administered by Verra can be added on to any VCS project to include social and environmental co-benefits of carbon projects. Similarly, Verra's SD VISta program opens the door to additional project enhancements that meet UN SDGs.

Given the age of most protocols and the rapid and significant change taking place in the forest carbon space, now may be a good time for updates to existing methodologies to introduce a more comprehensive approach to forest carbon projects. Bundling multiple related issues (e.g., climate, biodiversity, community viability) may or may not more effectively achieve targets than an 'a la carte' approach of stacking multiple issue-focused instruments, with corresponding payments tied to specific values, in a single project. It's also not clear that current options are tailored to a modular approach. However, the market is calling for "high quality offsets" that are at least partly defined by many stakeholders as nature-based credits that deliver co-benefits. It is also clear that in the absence of a federal government-led effort to establish a national carbon market, private sector leadership as well as state-level action is needed to fill the gaps.

4 US Climate Change Litigation Database, 2023. https://climatecasechart.com/us-climate-change-litigation/

The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report concludes that there is enough finance in the global system to mobilize sufficient climate mitigation, but more action is needed (IPCC, 2022). On average, global temperatures have already increased by 1.2° C. Even with NDCs and current policies in place, the UN says we're well off-track to keep global warming below even 2° C. That means even more mitigation may be needed from natural sources.

There is strong interest and momentum for mitigating climate change. Offset markets provide a mechanism to engage private capital and can be a powerful vehicle for advancing protections for related social and ecological values. Even with growth of regulated markets, the voluntary markets appear to continue to serve an important role in achieving climate targets. For example, the California cap-and-trade program applies to only about 75% of the state's total GHG emissions (Burtraw et al., 2022). The corporate interest activated by the climate crisis also presents an opportunity to direct attention and investment toward deliberate conservation of biodiversity and community viability.

Questions remain about the capacity of forests to contribute to climate mitigation. It remains to be seen whether improvements to offset integrity, along with evolving offset prices prove sufficient to materially contribute to slowing down climate change. These questions are compounded by consideration of how forests collectively service the many needs of society, and more broadly, Earth's biosphere. Multiple tools are in use to help project developers identify forests that optimize potential to generate offsets under various scenarios. Heat maps and underlying data have been developed to identify areas with the greatest risk of biodiversity loss. Several studies have identified forest dependent communities. But where are the forests with overlapping values, where are there existing or potential conflicts in value attainment, and what tools can be developed to help identify priorities and balance trade-offs?

The urgency of addressing the climate crisis has arguably led to focusing too narrowly on removal and storage of carbon in forests, at risk of losing sight of interrelated social and ecological values. Understanding where there is flexibility in management strategies to accommodate multiple values is critical for achieving comprehensive objectives and avoiding unintended negative impacts. Thoughtful, informed, and consultative assessments are needed to determine if and where regulation is most appropriate, where markets provide the best approach, and how to integrate both strategies in a practical way while protecting individual rights and freedoms.

Stakeholders should be aware of potential downstream impacts of a growing market for forest carbon offsets in order to take practical measures to plan and adapt to a changing climate and socio-economic dynamics. Are we missing opportunities to share perspectives, elevate awareness and integrate critical thinking among the full spectrum of stakeholders? With increased emphasis on building a more comprehensive understanding of potential downstream impacts, there is potential for development of integrated, multi-dimensional strategies that balance climate change objectives with social and ecological values.

Key Questions:

- Where there are forests with overlapping objectives, are there existing or potential conflicts in value attainment, and what tools can be developed to help identify competing priorities and balance trade-offs?

- Are the existing forest carbon offset protocols sufficient to ensure rural communities and biodiversity are appropriately addressed in the design and implementation of forest carbon projects?

- Are we missing opportunities to share perspectives, elevate awareness, and integrate critical thinking (and action) among the full spectrum of stakeholders?

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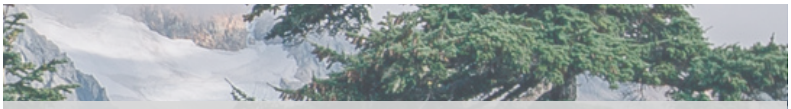

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