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A Landowner's Introduction to the Forest Carbon Market[1]

Natalia Medina-Irizarry, Michael Andreu, and Tamara Cushing[2]

Introduction

Currently, landowners generate income from their forests by participating in markets that have long existed in the United States. These include solid wood products, pulpwood, biomass, pine straw, and other types of nontimber products, leases, and mitigation banks. The forest carbon market is a new and emerging market with recent expansion into the US Southeast. This market presents new opportunities for landowners to generate income from their forestland. Such opportunities are emerging as part of the solution to address climate change. The carbon market schemes tackle the issues with greenhouse gases (GHG), particularly carbon dioxide (CO_2).

Through the process of photosynthesis, trees utilize CO_2, thereby removing it from the atmosphere and storing it for an extended period of time (IPCC 2021). We refer to the removal of carbon from the atmosphere as *carbon sequestration*. Essentially, the carbon accumulates in biomass, i.e., the *carbon pool*, and as more carbon is sequestered, *carbon storage* increases (see Florida Trees Store Carbon in Forests and Wood Products for further details on how trees reduce atmospheric CO_2). So, the question is, how exactly does increasing carbon storage generate income for landowners? Answer: by selling (or trading) the carbon their trees store, i.e. carbon trading. Simply put, forest landowners can initiate a carbon project on their property which generates carbon credits that are then sold in the forest carbon market.

Figure 1. A north Florida pine forest.
Credits: UF/IFAS

The purpose of this publication is to familiarize landowners and land managers with some of the terminology commonly used in the forest carbon market, how carbon credits have been deemed true and justified, and who's who within the forest carbon market.

Carbon Trading

Carbon trading is a market-based approach for reducing the release of GHG emissions to mitigate climate change (Perdan and Azapagic 2011). In forestry-based carbon trading, forest landowners receive payment for the *additional*

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2. Natalia Medina-Irizarry, Forest Systems Laboratory research assistant; Michael Andreu, associate professor; and Tamara Cushing, Extension assistant professor; School of Forest, Fisheries, and Geomatics Sciences, UF/IFAS Extension, Gainesville, FL 32611.

carbon stored in their trees following the implementation of approved management strategies. Additional carbon can be thought of as the carbon that was grown with intention to be converted to some forest product but is instead retained. Retaining this carbon pool and increasing carbon storage requires harvesting below the *business-as-usual* (BAU) scenario or *baseline activity*. For instance, a forest managed with a 35-year pine rotation (BAU), would accumulate additional carbon if a 45-year rotation (below BAU) was implemented instead. In this scenario, the additional carbon is then accounted for and issued in the form of carbon credits, which are the units effectively traded. Essentially, carbon trading provides landowners a monetary incentive to defer or avoid harvesting trees.

Carbon Credits

Carbon credits, aka: *carbon offsets*, are tradable certificates that represent a reduction in atmospheric CO_2 or an increase in carbon storage. One carbon credit indicates one metric ton of CO_2 or other GHG equivalent (Gupta 2011; Vacchiano et al. 2018). There are two types of carbon credits that supply different markets within the forest carbon market. The two types of carbon credits are Voluntary Emission Reductions (VERs), sold in the voluntary market, and Certified Emission Reductions (CERs), sold in the compliance market. There are further nuances between the creation of VERs and CERs. Projects that generate CERs are typically longer, have more restrictions, and require additional certifications and more frequent verification. That said, the payment received for each CER is higher than payments for VERs.

Carbon projects

A *carbon project* encompasses the group of activities associated with increasing carbon storage on a property. Carbon projects are also sometimes referred to as *carbon reduction projects*, *carbon offset projects*, and *carbon offset schemes*. Most carbon projects have a few elements in common. Generally, carbon projects are initiated with the creation of project design documents (PDD); a sort of "carbon management plan" or proposal. Formulating the PDDs involves developing the project concept, detailing project activities, specifying stakeholders, determining baselines, choosing standards and methodologies, and so on. There are three primary forest carbon project types: afforestation/reforestation, avoided conversion, and improved forest management (IFM). Each carbon project type has a specific set of actions required. Therefore, the type of carbon project a landowner may participate in depends on their eligibility for each project and the landowner's management objectives. More about project types when we discuss methodologies and protocols.

Additionality, Permanence, and Leakage

To ensure the integrity of carbon credits, some principleswere established for forestry-based carbon projects. The primary foundational principles are additionality, permanence, and leakage. For *additionality,* one must demonstrate that, without the commitment to the carbon project, the extra carbon capture would not have occurred. *Permanence* denotes the longevity of the carbon benefits resulting from a project, or, in other words, the length of time carbon is sequestered. Lastly, *leakage* is carbon released unintentionally because of the carbon project. For instance, leakage may occur when the reduction in harvesting of one forest results in increased harvesting of a neighboring forest. Each principle is accounted for differently across forest carbon programs, which impacts the relative value of the carbon credits generated. The various processes used to ensure that the the foundational principles are demonstrated in a given carbon project help determine the credibility of the carbon credit to the buyer.

Project Developers

Carbon project developers offer carbon programs that streamline the process of carbon project development, registration, and management for the landowner. Landowners will find that the majority of their interactions throughout the lifecycle of a carbon project will be with their project developer. The services offered by project developers, costs, surveying techniques, eligible standards, and methodologies vary for each project developer. Therefore, landowners should be aware of these differences before committing to a project developer's program. For instance, some project developers will take on projects at no cost to the landowner. However, their efforts are later compensated through commission when carbon credits are developed and sold.

Project developers may be independent organizations or individuals with an expertise or specialization in offset project development. Table 1 compares project developers that can help landowners develop a forestry-based carbon project.

Third-Party Verifiers vs. Registries

To ensure accountability, carbon projects must be verified by a *third-party verifier* and registered for tracking purposes. These verifiers are referred to as third-party

certifying bodies or third-party verification bodies. Third-party verifiers offer validation, verification, and certification of carbon projects against the standard under which the project is enrolled.

Registries are the system where the reporting of credits generated, credit ownership, credit sales, and credit retirement are documented and tracked. Such tracking of carbon projects is required for those who intend to participate in the voluntary and compliance markets because it safeguards carbon credits from being double counted, guaranteeing their credibility. In essence, the registries serve as the library or database that stores every project and transaction that takes place.

The terms "third-party verifier" and "registry" are frequently used interchangeably. Although they serve different functions within the carbon offset industry, the terms overlap in reference because third-party verifiers often have their own registry. For instance, the most recognized third-party verifiers in the United States include the American Carbon Registry and Verra, while their respective registries are named the American Carbon Registry and Verra Registry.

Validation and Verification Bodies (VVBs)

Carbon projects must be independently assessed to ensure project activities occur and the project performs as predicted. These independent assessments are carried out by *Validation and Verification Bodies* (VVBs). VVBs are independent companies—often environmental consulting firms—that have been approved and accredited by third-party verifiers to execute the validation and verification of carbon projects. Verification activities differ between project types but generally involve ongoing monitoring, assessment, and auditing until the project ends. Depending on the project developer and project requirements, a forester may visit the property to verify operations or the verification may involve remote sensing.

Carbon Standards

Just as Sustainable Forestry Initiative (SFI) has standards, *carbon standards* were developed for the purpose of providing rules and measurement criteria for carbon projects. Additionally, standards define what project success is and terms by which carbon credits must be quantified, monitored, reported, verified, registered, and issued.

Be attentive to the differences between carbon standards because individual components and terminology can vary, slightly complicating the decision-making process. Some of the most recognized standards in the United States include the American Carbon Registry (ACR) standards, Verified Carbon Standard (VCS), and Gold Standard. All three standards may generate carbon credits for both the voluntary and compliance market; keep in mind that not all standards do so.

Methodologies (Protocols)

Methodologies, also known as *protocols*, are the frameworks prescribed to carbon projects that define the rules and parameters under which carbon offsets need to be generated. These rules and parameters are used to determine the eligibility, additionality, and baseline or business-as-usual scenario of a carbon project. The most recognized methodologies are established by third-party verifiers for each carbon standard. However, project developers may develop their own methodologies, especially if available methodologies do not suit a particular project. New methodology proposals must be submitted to the carbon project's corresponding third-party verifier for approval.

Existing forestry methodologies include Improved Forest Management (IFM), afforestation/reforestation, Avoided Ecosystem Conversion, and Avoided Forest Degradation. Both the American Carbon Registry and Verified Carbon Standard have several versions of such methodologies pre-approved. The United Nations Clean Development Mechanism (CDM) and the Climate Action Reserve (CAR) are also widely recognized for their development of methodologies for forestry-based carbon projects. ACR accepts methodologies developed by the CDM, while VCS accepts methodologies developed by both the CDM and CAR.

For an example on how CO_2 sequestration, storage, and credits can be accounted for, see Carbon Dioxide Sequestration, Storage, and Offsets by Gainesville's Urban Forest.

Process of Enrollment

The creation of carbon projects differs broadly across project development organizations. Generally, landowners contact a developer and provide property maps, deeds, land assessment reports, management history, management plans, etc., to determine eligibility. If eligibility requirements are met, project design documents are developed by the landowner and project developer, then submitted to a third-party verifier for validation. Once a project is validated, it is then registered, and monitoring begins.

Monitoring may involve remote sensing or plots on the property. When monitoring begins, the *crediting period* also begins. The crediting period is the time during which emission reductions are verified and are eligible for issuance as carbon credits. The length of this crediting period is determined by the standards used. It can vary from a year to multiple decades long. After the crediting period ends, there is additional verification to ensure the reduction of carbon emissions or increase in carbon storage actually occurred.

Conclusion

While the climate continues to change at an accelerated rate, new and innovative solutions to address the climate will continue to be developed. It is important to understand the basics of such schemes, especially if there is interest and opportunity for landowners to participate. Although participating in a carbon program seems like a passive undertaking (simply letting your trees grow or deferring a harvest), it is vital to consider the impact of your land management decisions. The forest carbon market and carbon programs were first initiated in the early 2000s, but recent changes have resulted in more opportunities for smaller landowners to become involved.

Additional Resources

ASK IFAS: Carbon sequestration

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Table 1*: Comparison of project developers and the carbon project programs they offer (as of January 2022).

Project Developer	Eligible Locations	Property Size Minimum	Fees	Term Length	Carbon Standard	Property Assessment Method	Payment Reoccurrence
Natural Capital Exchange	Contiguous United States	None	None	1 year	VCS (currently seeking approval)	Remote sensing	Yearly
Family Forest Carbon Program By AFF & TNC	Specific counties in Pennsylvania[1]	30 acres	None	10–20 years	VCS	Forest Inventory Analysis (FIA) comparison	Yearly
CORE Carbon by FiniteCarbon[2]	All US states[2]	40 acres	None	40 years	ACR	Remote sensing	Twice a year
Forest Carbon Works	Contiguous United States and southern parts of AK	40 acres	$75 application fee	40 years	ACR	Historical aerial photography; FCW Forest Technician	Yearly
3GreenTree	No geographical restrictions; depends on forest type	None	Project is fully funded by landowner(s)[3]	20–40 years	VCS or ACR	Remote sensing and field plots	Yearly

[1] Future opportunities in the Southeast
[2] Rolling out regionally in 2022 beginning with the Southeast, followed by New England and the Lake states. Between the end of 2022 and beginning of 2023, the program is expected to rollout in the Midwest and Southwest.
[3] Costs to the landowner(s) range from $60,000–$80,000
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