

Forest Carbon for the Private Landowner (2): Protocols, Project Examples and Opportunities

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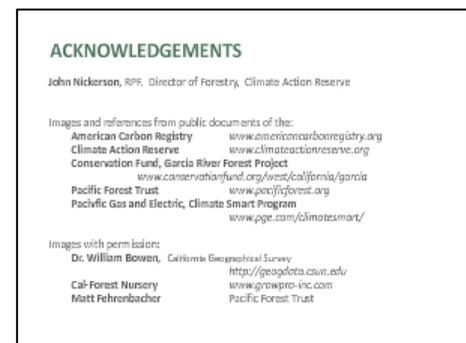
Slide 1. Carbon Assessments and Markets

Hello, I'm Andrea Tuttle. I'm a former state forester for the state of California. And when I was there, which was in 1999 through 2005, I was always looking for potential revenue streams to help keep nonindustrial forest landowners on the land. And when the issue of climate mitigation and potential carbon markets came up, I decided I wanted to learn about them. California passed legislation in around 2002 that required that forest carbon protocols be developed by what was then called the California Climate Action Registry, so I've been tracking the development of the protocols and all the issues that come up when you try to create something that has never existed before. So, now we're on version 3.2 of the protocols, so we've had a pretty good learning curve.



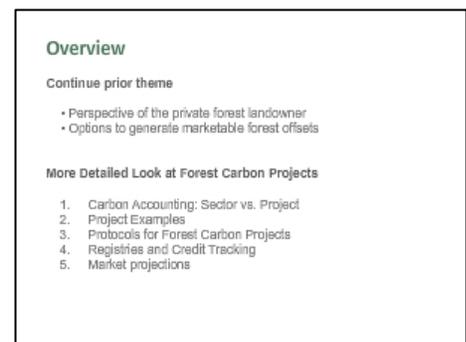
Slide 2. Acknowledgments

I'd like to acknowledge a series of references here, and John Nickerson in particular, who is now Director of Forestry for the Climate Action Reserve.



Slide 3. Overview

I'm going to continue the prior theme of talking about the private forest landowner and opportunities for marketable credits, and we're going to look at projects in more detail, make the differentiation between sector and project accounting, look at some project examples, look at the protocols or the rules for creating a carbon ton, a little bit about registries, and then a bit about market projections.



* This document transcribes the presentation given by Dr. Tuttle. The presentation is part of General Technical Report NRS-93, "Forest and grassland carbon in North America: A short course for land managers." The full report, comprised of 15 presentations, is in DVD format and can be obtained at <http://nrs.fs.fed.us/pubs/order/40110>. The presentations and related materials can also be accessed at <http://www.fs.fed.us/ccrc/carboncourse/>

Slide 4. Sector vs. Project Accounting

In some of the prior talks, we've referred to sector accounting for the country as a whole where you're looking at the total forest carbon sink aggregated at a national level. And this information is used for greenhouse gas reporting under our obligation under the U.N.¹ Framework Convention on Climate Change. So the U.S. EPA² collects this data on emissions and sinks and we submit it. In comparison, when you're talking about project accounting, you're talking about the emissions from specific forest carbon projects where the purpose of the project at its most fundamental is to benefit the atmosphere.

Slide 4: Sector vs. Project Accounting

FOREST SECTOR ACCOUNTING
 = Total forest carbon stock aggregated at the national level (or other sub-national jurisdiction)

- Forest Sector Information
 - Used for National GHG Reporting
 - In compliance with the UN Framework Convention on Climate Change (UNFCCC), signed by the US in 1992
 - Sector accounting also used in REDD+ tropical forest crediting
- US EPA collects GHG emissions and sequestration data and reports annually to the UNFCCC:

e.g. National GHG Emissions in 2008 (Tg CO₂e)

U.S. Net GHG emissions 2016 @ Tg CO ₂ e	=	Total Emissions all sectors	-	Net sequestration
	=	8,956.0	-	540.3

* 1 Tg = 1 teragram = 1 million metric tonnes = 1 MMT
 1 Gt = 1 gigaton = 1 Pg petagram = 1,000 teragrams = 1 billion metric tonnes
 CO₂e = carbon dioxide equivalent

SOURCE: U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) 2010-2011. (Apr 2012). U.S. EPA (2014) 42-108

Slide 5. Project Accounting

In comparison, when you're talking about project accounting, you're talking about the emissions from specific forest carbon projects where the purpose of the project at its most fundamental is to benefit the atmosphere. The goal of the project is to produce additionality, and additionality is defined as greenhouse gas removals or reductions that are additional to what the atmosphere would otherwise see. They're more than the business as usual scenario, and it's that additionality that can become the marketable forest carbon credit.

Slide 5: Project Accounting

FOREST CARBON PROJECT =
 Set of actions in a defined geographic area where:

- Purpose of Project: Benefit the atmosphere
- Goal: Produce Additionality

ADDITIONALITY = GHG removals or reductions that are additional to what would otherwise occur under a Business as Usual (BAU) scenario
 - More C stored than the atmosphere would otherwise see
 - Additionality can become a Marketable Forest Carbon Credit

e.g. Forest Carbon Projects within Forest Matrix

Avoided Conversion South Carolina
Improved Forest Management, California
 Public documents: www.dawsonforwood.org

Slide 6. Defining the Forest Carbon Credit

The way we define this thing called a credit is through protocols, which are the rules for defining the ton. They consist of standardized methods that meet the criteria of real, additional, permanent, verifiable, and they were created because there were a number of protocol systems that came out originally. It was sort of a Wild West of how do you define a carbon ton, and the traders and the forest community needed something where they, you need to know what you're getting. So over time the various protocols have coalesced, and we have now two or three established protocol forms for the domestic market. One is the American Carbon Registry which issues emission reduction tons. Then there's the Climate Action Reserve which issues climate reserve tons. The Verified Carbon Standard is mostly an international system. Some of you may be familiar with CCX, the Chicago Climate Exchange. That one is no longer in the protocol carbon credit business.

Slide 6: Defining the Forest Carbon Credit: Protocols And Methodologies

Forest Carbon Protocols are the rules for defining the "Ton"

- Consist of standardized methods for creating credits that meet the criteria: Real, Additional, Permanent, Verifiable and Standardized
 - Methods are objective, transparent, repeatable
 - Reduce transfer risk for project developers
 - Reduce market uncertainty
- Protocols were developed in response to need for a fungible, tradeable carbon commodity: "know what you're getting"
- Available for variety of carbon types (sectors outside the crop: e.g. Livestock biogas, ocean sequestering, silviculture, nitric acid production, forestry)

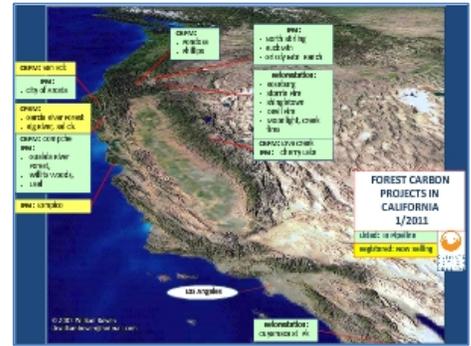
Standard Setting Bodies for Voluntary and pre-Compliance Markets: e.g.

ACR: American Carbon Registry	ERT: Emission Reduction Tons
CAR: Climate Action Reserve	CRT: Climate Reserve Tons
VCS: Verified Carbon Standard (Verra: 2004) (Formerly "Mitsun" Carbon Standard)	VCU: Verified Carbon Units
CCX: Protocol functions discontinued 2010)	
Panda Standard (under development in China)	- will include a SFM protocol

American Carbon Registry
 CLIMATE ACTION RESERVE
 VCS: VERIFIED CARBON STANDARD
 A World of Carbon for a Better Future

Slide 7. About 21 Projects in California

Because the protocols first developed in California, we have a number of projects that have already gotten going. We have at least four projects that are currently selling to the voluntary market, and we have another 20 or so in the pipeline, meaning in the verification process.



Slide 8. CAR Forest Protocols Now Applicable Nationwide

And because these protocols have grown and now use a different baseline, the protocols are available for projects nationwide, and we are starting to see a number of projects developing throughout the United States. This is the map. The underlying map is the Forest Inventory Assessment map, which is used as part of the baseline determination.



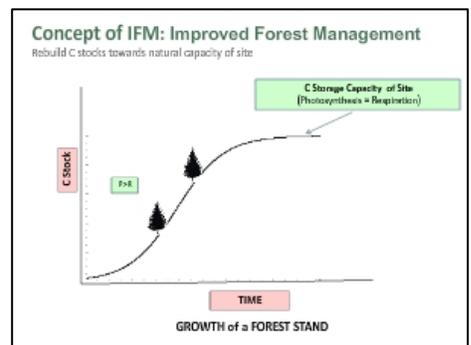
Slide 9. Protocols Available For Forest Carbon Projects in U.S.

The types of forest carbon projects that have protocols available for them now are first of all avoided deforestation or avoided conversion in which we want to keep forests as forests that would otherwise develop. The second type is improved forest management, IFM, and this is where we increase carbon stocks within working forests that for some reason have a degraded carbon stock now, and we try and rebuild and hold that carbon stock more towards its natural carrying capacity. Then there are reforestation and afforestation protocols where we're putting trees back on the ground where they were not before. I'd like to note that there are no protocols for avoided wildfire. We gave this a try, we really tried to see if thinning and so on could reach the criteria and the credibility for an offset, and it's simply just too difficult to prove that your forest management project avoided a fire, and the numbers were just too difficult to make it legitimate.



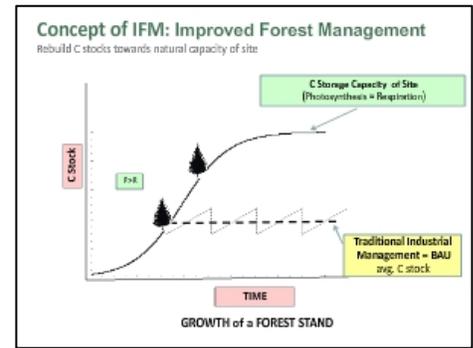
Slide 10. Concept of IFM

Let me quickly go through the concept of an improved forest management program. This graph is the growth of a stand as you start with nothing and the trees grow very quickly at first. Photosynthesis is greater than respiration and eventually it levels out where photosynthesis equals respiration.



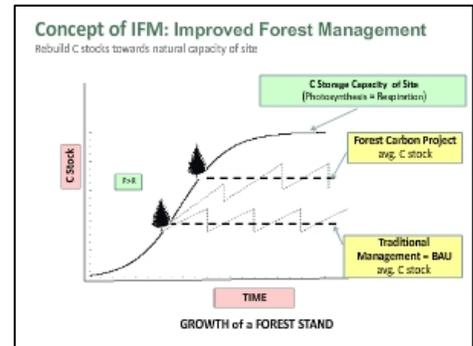
Slide 11. Traditional Industrial Mangement

So much of the traditional industrial management holds the carbon stock down because the job is to move the carbon into the wood products pool, and they're not managing for old growth. So you could consider this as a business as usual type of grow harvest, grow harvest with an average carbon stock.



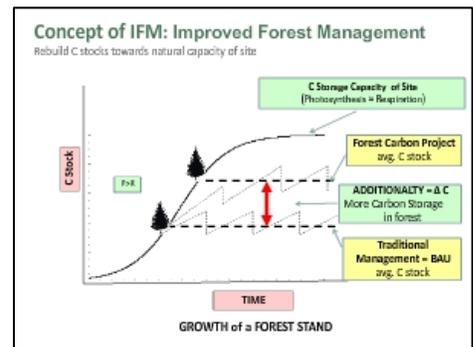
Slide 12. Forest Carbon Project

And then you decide, I'm going to do a forest carbon project for purposes of the climate, so you would, through altering your rotations, through altering your amount of harvest versus growth, you could build the stocks up...



Slide 13. Additionality

...continue to grow and harvest, but the basic stock on the land would be higher. So that additionality is what becomes the basis for carbon credit.



Slide 14. Generic Project Design Process

The generic design process, first of all you have to decide if your project meets basic eligibility requirements. Are you above legal requirements? Do you meet some financial tests? You look at your regional setting and then you start quantifying your business as usual. You need to have a carbon inventory for your forest as it is and you project out what your carbon stocks would be as a baseline scenario. And then you go through that again to determine what additional carbon stocks you would get from your project.

Generic Project Design Process	
See Protocols for specifics	
1. Determine Eligibility of your proposal	<ul style="list-style-type: none"> Additionality: Meet 3 tests <ul style="list-style-type: none"> Legal/requirement test: Above what is required by law Performance test: Above what would occur under Business As Usual Financial Test: Demonstrate that growth and harvest regime assumed for the baseline is financially feasible Meet other administrative reqmts: Defn. of forest; Start Date; Crediting Period; Regulatory Compliance; Co-benefits
2. ID Project Area and Regional setting	<ul style="list-style-type: none"> E.g. IFM; F&R; supervision
3. Quantify Net GHG Reductions and Removals	<ul style="list-style-type: none"> Determine Current C stocks <ul style="list-style-type: none"> Stratify vegetation types and conduct C inventory Include required C pools: live above and below ground; standing dead; wood products; soil (if significant change) Determine BAU Baseline per protocol Determine C Gains from Project activities Take deductions for: Uncertainty; Leakage; Buffer pools; other risk factors per protocol <p>C Credits = Project C – Baseline C – Other Deductions</p> <p><small>*Note: As of March, 2011 CAR no longer credits optional carbon pools until standardized guidance for accounting is adopted. This includes soil carbon and living dead wood.</small></p>

Slide 15. Generic Project Design Process

You need to insure permanence. I'll talk about this a bit more in a moment. You need to have vigorous monitor reporting verification. Third party verifiers are required. Periodically they do desk reviews, and then on say five-year intervals they need to go out on the ground and actually make sure that your carbon is still there. Your project then is reviewed by the protocol body and at the end of the day the credits are issued, they are given an individual serial number, they are tracked through a registry, and when they are applied against an emission as an actual offset, then that number is cancelled so there's no double counting.

Generic Project Design Process	
See Protocols for specifics	
4. Ensure Permanence	<ul style="list-style-type: none"> • Insure against Avoidable and Unavoidable Reversals (i.e. the return of stored C to the atmosphere: e.g. Wildfire, Disease, or Voluntary termination of the project) <ul style="list-style-type: none"> – Make contribution to Buffer Pools according to degree of risk → Default table of risk – Purchase Insurance Instruments (AIG) • In event of reversal, repay credits per prescribed scale • Buffer Pool may be managed by protocol body or registry
5. Project MRV (measuring, reporting and verification)	<ul style="list-style-type: none"> • By accredited 3rd Party Verifiers • At prescribed intervals according to the protocol e.g. Annual reporting based on desk review; Verification by site visit every 5-6 yrs.
6. Review by Protocol Body	
7. Credits Issued	<ul style="list-style-type: none"> • Given a Serial Number • Tracked in a Registry • Retired when used against an emission

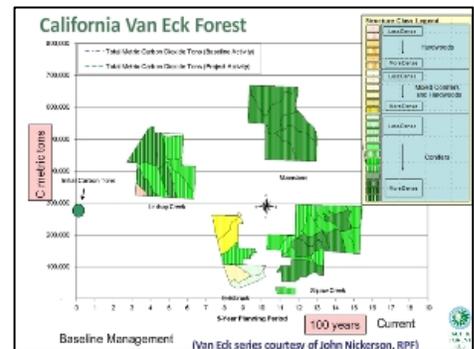
Slide 16. Project Example: Van Eck Forest

Here's an example of one of the early forest projects. It's the Van Eck Project in northern California. It uses a prior baseline calculation, but it's still a useful example here where the project was defined as not harvesting as intensively as had occurred. The project was to harvest only 50 percent of growth.



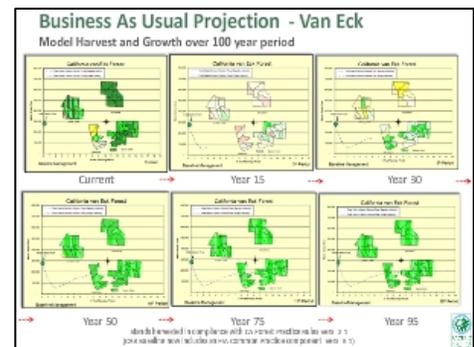
Slide 17. California Van Eck Forest

So, in the middle of the graph here you see the stands. These are the stratified stands. You see different age classes of hardwoods and conifers, and we're going to start managing these stands over a 100-year period modeling out what the carbon stocks would be.



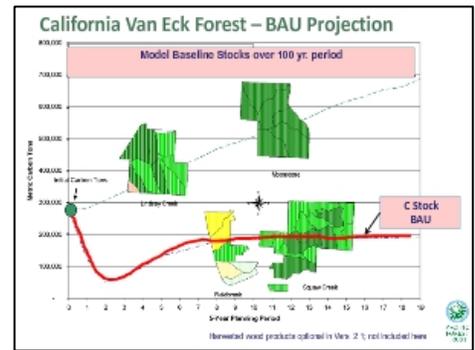
Slide 18. Business as Usual Projection

So starting in the upper left, this is your current condition. Then you would cut some of those stands, they would start growing, and this goes over the 100-year period across there...



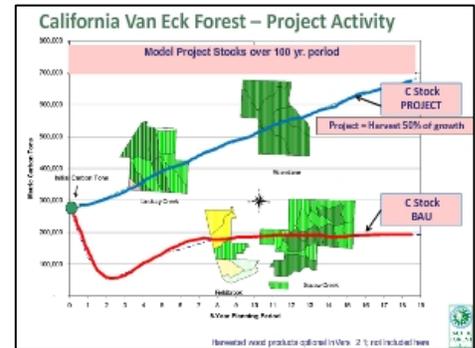
Slide 19. BAU Projection

...and you would plot those carbon stocks as the red line here. That's your business as usual. Now you start over again and you do this same technique only you harvest 50 percent of growth...



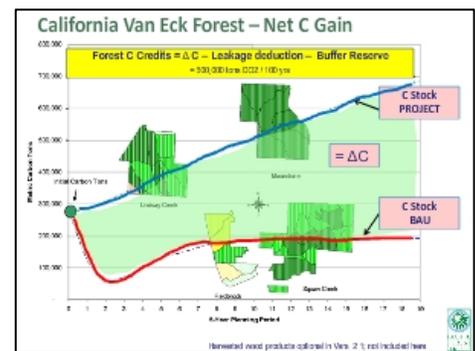
Slide 20. Project Activity

...and at the end of those calculations you come up with another carbon number...



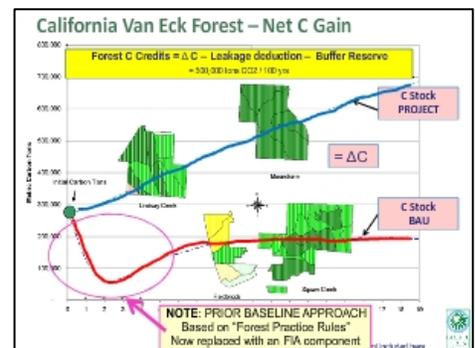
Slide 21. Net C Gain

...and the difference between those is your delta C or your additionality. Now you don't get to sell all those credits. There are various deductions you need to take. There's a calculations that are made to deal with leakage, you need to take some of those credits into a buffer reserve for permanence...



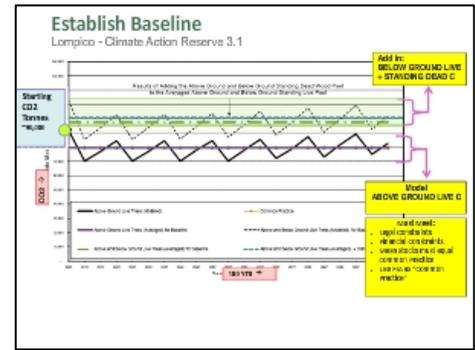
Slide 22. Prior Baseline Approach

...and there are some uncertainty deductions also. I just want to flag that this is the part of the curve where probably the difference in baseline makes a difference.



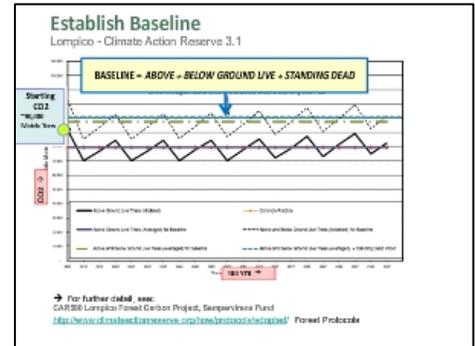
Slide 27. Below Ground Live and Standing Dead C

Then you need to add in your belowground live, your roots, and your standing dead carbon...



Slide 28. Baseline Equals ...

...and at the end of the day you're shooting for that blue line there, which is your baseline from which additionality would be calculated.



Slide 29. Harvested Wood Products

You also need to add in your harvested wood products pool. There are charts and worksheets to help you do this where you decay out over a 100-year period of time the various components of your wood products, both while they're in use and while they are in landfills.

Establish Baseline
Lompico - Climate Action Reserve 3.1

→ THEN ADD IN: Harvested Wood Products

HWP = A required C pool both in Baseline and Project projections

Use Worksheets and default tables for estimating C stored for 100 years as:

- Wood Products in Use
- Landfill Carbon Storage (included when project harvesting is below baseline)

→ For further detail, see:
Appendix C Climate Action Reserve Forest Protocols
<http://www.climateactionreserve.org/how/protocols/adopted/>

Slide 30. Compare Domestic Forest Protocols

Comparing the two domestic protocols that we have now, actually the American Carbon Registry and the Climate Action Reserve. They're actually quite similar in most of their fundamental characteristics. Their process of developing them is a little bit different. The ones from the Climate Action Reserve are recognized by the California Cap and Trade System as being eligible when that program starts, we hope in 2012. The really large difference has to do with how permanence is treated. The reserve protocols wanted to make sure that that carbon stays on the ground and so the commitment for an approved forest management project is that that carbon be held for 100 years. Your crediting period and your minimum project term is 100 years. Whereas the American Carbon Registry took a different philosophy. They have a 40-year commitment, and that means that the buyer of the credits will have to then fill up the rest of their permanence requirement.

Compare Domestic Forest Protocols	
Generally similar except, e.g., see Protocols for specific	Key differences
<p>The Climate Action Reserve Forest Protocols Version 3.2* August 31, 2010</p> <p>✓ Process</p> <ul style="list-style-type: none"> Multi-Stakeholder workshop Public comment Adoption by CAR Board of Directors Eligible as credits in Calif. ARB Cap/Trade system <p>✓ Applicability: * Nationwide</p> <p>✓ Co-benefits: Natural forest management (value approx. \$6/young tree)</p> <p>✓ Minimum project term: * IFM 100 yrs.</p> <p>✓ Crediting Period: * IFM 100 yrs.</p> <p>Baseline:</p> <ul style="list-style-type: none"> Legal and Performance based Incorporates "Common Practice" per FIA Modest C stock over 100 years 	<p>The American Carbon Registry Forest Carbon Project Standards Vers. 2.1* Nov. 2010</p> <ul style="list-style-type: none"> Technical drafting team Public comment period Scientific peer review <p>✓ Applicability: Worldwide</p> <ul style="list-style-type: none"> Templates and Tools by project type Community and environmental impacts not possible covered <p>✓ Minimum project term: * 40 years for project proposal</p> <p>✓ Crediting Period: * IFM 20 yrs; AR 40 yrs; REDD 10 yrs. Renewable with updated baseline</p> <p>Baseline:</p> <ul style="list-style-type: none"> Legal; Performance, 3 prong test e.g. maximize NPV of perpetual wood products harvest in 100 year time Baseline projected over first 20 years

Slide 31. Permanence

Science indicates that when a ton of carbon is emitted into the atmosphere it's out there for at least 100 years if not more, and so if you're talking about permanently offsetting an emitted ton, you need to think in those time scales. So various approaches have been used to deal with permanence. One is that you have to show periodically that the carbon is still there and you need to compensate if there are reversals, which because forest carbon is vulnerable to fire and disease and to voluntary termination of the project. If you just say I want out, you do need to compensate for that reversal. So one approach is to maintain a buffer pool, which is managed, in the case of the Reserve that buffer pool is managed by the Reserve, and now insurance policy mechanisms are starting to emerge so they can simply insure your carbon stocks.

Permanence

Challenging Issue for Forest Projects:
 Unlike other offset types, forest carbon storage is Reversible
 → Wildfire, Pests and Disease, Voluntary termination of project
 Carbon emitted to atmosphere from fossil fuel combustion
 → Lasts a long time (100 – 1000+ yrs.)
 Q: Who bears the burden for meeting permanence:
 → Buyer or Seller?

Approaches to Ensure Forest Carbon as an Offset:

- All approaches require MRV (Monitoring, Reporting and 3rd Party Verification of C Stocks)
 - Monitoring of credits C stocks per a required schedule
 - 3rd Party Verification: On-site review and periodic site visits
- Compensate for Reversals: Sign legal agreement to replace credits in event of reversal
- Maintain Buffer Pool as insurance against Unavoidable reversals
 "General Risk Pools" (Whichever used to determine set-aside for each project, for each verification period)
 - Buffer Pool may be managed by the Standards Body
- Purchase Insurance Policy to backfill credits in case of reversal

***Please note a pre-announcement regarding the permanence standard for the American Carbon Registry:
 The 40 year permanence requirement applies to both earlier and later.**

Slide 32. Aggregation of Small Projects

I'm not going to go into great detail, but let me just say there are aggregation policies so that you can get more efficiencies of scale by aggregating small projects. The biggest costs are your carbon inventories and your verification, and if you can get more, there's some provisions that allow you to have fewer sample plots if you have an aggregation.

Aggregation Of Small Projects

Largest costs of forest projects:
 • Carbon Inventories • Periodic Verification

Purpose of Aggregation Policy:
 • Allow smaller owners/buyers to join together as an Aggregate project
 • Reduces transaction costs for individual landowners
 • Enables economies of scale and marketing of offset credits at volume

Benefits:
 • Fewer sample plots
 • Reduced to generate forest carbon inventory of sufficient statistical certainty to avoid a confidence deduction.
 • Less frequent verification schedule

Example Requirements: See Protocols for specifics
 • No limit to number of projects within an Aggregation; each landowner <5000 ac;
 • Each project registers individually and maintains separate account.
 • Liability for reversals lies with each individual Forest Owner.
 • If a project leaves the aggregate, statistics must be re-adjusted.
 • An Aggregator is required: Maintain the project accounts; Selects the verification body; Coordinates Verification schedules. May offer project development services, manage monitoring etc. per negotiated contracts between each forest owner and the Aggregator.

See:
 ACR: www.verificationentity.org/index.aspx?ACRForestCarbonProjectStandardv2.1.pdf
 CAR: www.carboncredits.com/usa/protocols/aggregate/forestry/forestry/

Slide 33. Registries: Keeping track

The word registry has been used broadly for a number of different functions. Let me separate out a few. There are those registries which are simply for recording greenhouse gas emissions. The Voluntary Climate Registry is one, the EPA is starting one for greenhouse gas emission reporting, and then there are registries or reserves that get into the offset protocol business. They issue credits, they track the offsets, and they manage transactions. You have like a bank account where you're showing how many credits you have in your account and how you've sold them or transferred them. The financial side of it is a whole nother set of entities dealing with the trading platforms and how the credits, once you generate them, are then handled in the market.

Registries: Keeping Track

Various Functions:

- Report GHG Emissions: Set consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions. (e.g. TCR, US EPA)
- Develop Offset Protocols: Develop offset methodologies that are credible, transparent and provide financial value (e.g. CAR, ACR, VCS)
- Issue Credits; Track Offset Projects: Award offset credits; track vintage, retirement of credit against emissions (ACR, CAR, VCS).
- Manage Transactions: Administer Member Accounts; transaction reporting; and credit retirement (ACR, CAR, VCS)

Trading Platforms; Financial Services = Separate Function. Buying, selling, brokering, aggregating credits and allowances, project development, etc. OTC, Exchanges; Spot markets, futures...

Logos: Verra, American Carbon Registry, VCS, APX, Carbon TradeExchange, etc.

Slide 34. Example Project Tracking

On the Climate Action Reserve Web site you can see where the project tracking portion is and where the text of the protocols are. This is all very transparent. You can go to these project design documents and see what's being included.

Example Project Tracking: Climate Action Reserve
www.climateactionreserve.org

Transparency: Project Documents posted online

Document Type:

- Attribution of Registry Compliance
- Attribution of Title
- Attribution of Voluntary Implementation
- Project Design Document
- Project Submittal Form
- Verification Opinion
- Verification Report

Slide 39. Need to be Realistic

...but we have to be realistic. This is not really the pot of gold. Carbon will usually be a sweetener for a project, a tipping point. It usually doesn't drive an entire project and really right now we don't know where the markets are going. There's a stalemate in Congress, the European Market does not accept forest credits at this time, and so you need to just be realistic.



BUT: Need to be realistic

- US trading market is uncertain under current Congress
 - Administration focus on energy alternatives and efficiency, not Cap and Trade
- California market will be strong, but limited
- WCI Partners have own state and provincial politics
- European market EUETS currently does not accept forest credits
- Unclear timing for REDD+ credits
- Voluntary and Pre-Compliance market will continue at some level
 - Corporate social responsibility (CSR); Supply chain requirements



Slide 40. Summary

As a summary, as Sarah³ mentioned, forest carbon offsets are a bridging strategy until we really have technological changes and fuel changes. We need to have high standards because we're talking about the integrity of the atmosphere, and forest carbon may indeed provide an additional revenue stream. Forest carbon is a product to be evaluated just like any other forest product. Do you want a 2 x 4, do you want pulp, plywood, whatever it is, consider it as an option and whether it's appropriate for your management objectives. So thank you very much.



Summary

Forest Carbon for the Private Forest Landowner

Forest carbon offsets are a Bridging strategy until GHG reduction technologies and a low-carbon economy are in place

- Carbon management leaves forests as forests
- Offsets many public and private co-benefits

Need high standards for forest credits: integrity for atmosphere

- Offsets must be "above what the atmosphere would otherwise see"
- Offsets allow emissions, therefore they must be real
 - Meet tests of BALPS: Baseline, Additivity, Leakage, Permanence, Verification
 - Be defined by a standardized Protocol or Methodology
 - Tracked in an established Registry
 - Traded on a legitimate financial platform

May provide a supplemental revenue stream

- Forest Carbon is a product to be evaluated like any other option
- Potential for Forest Credits is a function of current site condition, site potential, alternative forest products, opportunity costs, landowner objectives
- Prices will depend on markets e.g. supply and demand of allowances and offsets; other offset types; availability of REDD+ credits; alternative emission reduction technologies etc.

Footnotes

¹ U.N.=United Nations

² EPA=Environmental Protection Agency

³ See Forest Carbon For the Private Landowner (1): Basics of Carbon Offsets, Markets, and Trading by Sarah Hines, this report.