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MAKING TREES GREENER:
OPPORTUNITIES IN ECOSYSTEM SERVICES
FOR TIMBERLAND INVESTORS

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Economic Research and Analysis

November 2009

Introduction

There is a paradigm shift emerging within the timberland asset class. Less than a decade ago, the traditional path to value creation consisted of two elements: (1) generating income from the sale of logs to wood products manufacturers; and (2) realizing the capital appreciation of the standing timber and land by liquidating investments once they had reached economic maturity. However, the emergence of markets for ecosystem services is changing the timberland investment landscape – providing new and expanded opportunities to monetize the value of commercial forests. For instance, among other things, carbon credits are now being sold to capture the value of carbon sequestered in working forests.

Before we explore these trends and their implications, we need to lay the groundwork and define what we mean by *ecosystem services*.

> Broadly speaking, **ecosystem services** are products, functions and amenities derived from natural systems that provide benefits to people. In an investment context ecosystem services are particularly relevant if they can be effectively monetized in an established market. By market, we mean a defined structure where the goods, services or rights can be exchanged for money from one party to another. However, not all ecosystem services have markets. There is no market, for example, in which forest owners can charge for the clean air and oxygen produced by the owner's trees.

The purpose of this paper is to provide the timberland investor with a practical guide and introduction to the rapidly developing markets for *ecosystem services*. We begin by analyzing the ecosystem services that are applicable to a timberland holding. We then define and explain the nature and functional characteristics of each ecosystem service market and provide a perspective on its relevance to timberland investing. Finally, the paper concludes with a series of recommendations on how best to leverage ecosystem services markets to enhance the risk-to-return profile of an investor's timberland portfolio. Because markets for ecosystem services are highly localized and country specific, the paper focuses on the United States exclusively. However, many of the topics and issues addressed are generally applicable to

other regions as well. The closer a nation's environmental policy and regulatory framework conforms to that of the United States, the more relevant the paper will be to timberland investments in that region as well.

Survey of Ecosystem Services Markets for Timberland

Overview

The emergence of ecosystem services in private forestry are, in many respects, a reflection of society's growing acceptance of free markets to facilitate environmental change. Historically, government relied on a combination of regulation, taxes, subsides and outright possession to achieve environmental goals and conserve ecosystems. However, policy makers are increasingly recognizing that markets for ecosystem services can be an effective means of protecting or promoting nature's goods and services. There also is growing acceptance that landowners have the right of choice and ought to be compensated at a personally acceptable level for the many benefits their forests provide to society.

Nevertheless, private markets for environmental services typically are not created in a vacuum. Many (but not all) ecosystem services markets are products of government intervention or public policy initiation. Some markets for carbon credits, for instance, are based on government mandates to limit the production of greenhouse gases (GHG). Wetlands mitigation banking is the result of the U.S. Clean Water Act, which focused, in part, on reducing the net loss of wetlands caused by development.

However, governments are not the only entities spurring the creation of markets for ecosystems services. Both the non-profit and the for-profit sectors support the concept of reimbursing landowners for creating or conserving the ecosystem values of their forests. The birth of a voluntary carbon trading market, where private companies and individuals reduce their carbon footprints by paying others to grow trees on their behalf, is one such example. Likewise, non-profit environmental organizations may pay landowners for conservation easements to keep a forest from being developed.

Table 1. List of the major ecosystems services markets accessible to U.S. timberland investors.

Sector / Market	Valued Timberland Product or Service
Carbon Credits	Carbon sequestered in trees, soil and long-lived wood products
Conservation Easements	Land development rights
Mitigation Banking / Offsets	Creation of wetlands, streams, and endangered species habitat to offset similar losses elsewhere
Recreation	Enjoyment of forest amenities through recreational or leisure activities such as hunting, fishing, birding, and hiking

With this background as context, Table 1 provides a current list of applicable environmental markets for timberland. These emerging markets could, in certain situations, provide opportunities for a timberland owner to generate income that adds to, or substitutes for, traditional sources of timberland income. Each of the markets listed in Table 1 are discussed in detail below to outline how they relate to the interests of timberland investors.

1. Carbon Credits

Overview

An ecosystem service sector that has shown significant growth in recent years is the market for carbon credits. The source of this growth is the desire of governments and private organizations and individuals to limit the release of *greenhouse gases* (GHG) into the atmosphere. Greenhouse gases are gases that have a significant capacity to trap the thermal radiation that is reflected from the surface of the earth when the ground is hit by sunlight – thereby creating the so-called "greenhouse" effect. Rising levels of these greenhouse gases in the atmosphere are thought to be a leading cause of global climate change and the leading greenhouse gas is carbon dioxide, which is the product of industrial society burning fossil fuels. The standard unit measure of greenhouse gas is the carbon credit, which represents the heat trapping ability of one metric ton of carbon dioxide (1 tCO_2e).

In order to reduce the threat of climate change, limits are placed on how much greenhouse gas is emitted into the atmosphere. There are two ways to reach these limits. The most obvious way is for the GHG producer to reduce its own emissions. A second way is to pay someone else to cancel out those GHG emissions by reducing the payee's emissions or removing GHG directly from the atmosphere. The process of exchanging payments for net reductions in emissions is known as *cap and trade.* There are two forms of cap

and trade: allowances and offsets. Allowances entail the trading of emissions rights within industries. Power utilities are the typical candidates for the use of such allowances. The trading of nitrous oxide emissions permits among coal-fired power plants in the United States is an example of an allowance based cap and trade system that is currently in effect. In comparison, an offset is a merchantable representation of one ton of carbon dioxide that has been sequestered, avoided or reduced. Carbon credits can be purchased inside or outside of one's industry sector to offset one's carbon output (i.e., a coal power plant can purchase forest-based carbon credits to help offset its carbon emissions). The carbon offset market increasingly offers forestland owners the potential to sell carbon credits based on the capacity of their trees to sequester carbon dioxide.

Current Carbon Offset Opportunities for Forestry

Forests can take up (i.e., sequester) atmospheric carbon dioxide and store it for long periods in (a) living trees, including their roots, branches and foliage; (b) understory plants and the litter layer; (c) the soil; and (d) long-lived wood products such as lumber used to build homes and furniture. If properly accounted for and verified using internationally accepted standards, the carbon a forest stores can serve as carbon credits which can be sold in carbon offset trading markets. By one estimate, U.S. forests sequester more than 200 million metric tons of CO_2 per year, which amounts to roughly 10 percent of all U.S. industrial emissions.[1]

Sidebar 1

How much carbon can a forest sequester?[1]

- On average, a sugar maple tree with a 16" diameter at breast height (DBH) contains 2.36 tCO_2e above and below ground – which will amount to 2.4 carbon credits.
- A 16" DBH loblolly pine holds about 1.33 tCO_2e.
- A 16" DBH yellow poplar holds about 1.78 tCO_2e.
- Most U.S. forests can capture between 0.5 to 4.0 tCO_2e per acre per year.
- How much income does that represent if it is sold in carbon trading markets? Given historic prices on the Chicago Climate Exchange, expect income of about $2 to $10 per acre per year for a typical growing forest.

As is outlined above, theory and potential, however, do not readily translate into real world application. The good news is that the ability to market forest-based carbon stocks is now established in the international community and commonly accepted procedures and methods are being established. The bad news is that accounting for the long-term storage of carbon in wood products remains a clouded issue. Many carbon

A newly planted plantation of pine. Reforestation and growing trees to maturity is one source of generating carbon credits.

markets will not accept carbon stored in harvested trees when those trees are converted into long-lived products, like building materials and furniture. Other carbon markets lack consistent rules or are too restrictive to be of value.

These issues aside, a forestland owner can earn carbon credits in four different ways:

1. **Afforestation:** Planting and growing new trees on land that was not a forest before. Converting agricultural land to forestland is one example of afforestation.

2. **Reforestation:** Taking a harvested forest area and replanting it with a new generation of tree cover.

3. **Preventing Deforestation or Degradation:** Preventing the damage or loss of forests that otherwise would have occurred without special intervention. This practice is known as REDD (or reduced emissions from deforestation and degradation).

4. **Grow an Existing Forest:** Managing a forest specifically to add more net carbon in the trees, understory and soil.

For many developed economies such as the United States, the opportunity with the greatest potential to create merchantable carbon credits lies in reforestation and tree growth. Conversely, the potential for earning carbon credits from afforestation and the prevention of deforestation is limited. Those opportunities are primarily available in developing countries where the main issue is preventing the loss of native forest cover.

Table 2. List of greenhouse gas credit offset trading markets applicable to a U.S. timberland owner.

Carbon Trading Market	Abbreviation	Coverage	Comments
Voluntary			
Chicago Climate Exchange	CCX	Global	
Over-the-Counter	OTC	Global	
Compliance/Regulated			
Regional Greenhouse Gas Initiative	RGGI	CT, DE, MD, MA, ME, NH, NJ, NY, RI and VT	
California Climate Action Registry	CCAR	CA	
Western Climate Initiative	WCI	USA: CA, NM, OR, WA, AZ AND UT; Canada: British Columbia, Manitoby and Quebeck	Under Development
Midwestern Region GHG Reduction		USA: IA, IL, KS, MN, WI and MI; Canada: Manitoba	Under Development
Federal Cap & Trade Program		United States	Under Development in Congress

Lack of Harmonization Impedes Carbon Markets for Forests

Selling carbon offset credits from a forest is not a straightforward task. One of the first choices a forestland owner needs to make is deciding in which carbon trading markets to participate. These markets are divided between voluntary and compliance (mandated) markets. Table 2 lists the carbon trading offset markets that could apply for a U.S. forestland owner.

As seen in Table 2 above, the U.S. carbon market is still in the early stages of development. Aside from California and parts of the U.S. Northeast, the compliance market is essentially non-existent. In most cases, a U.S. forestland owner, at present, is only able to sell carbon credit offsets in the voluntary market. Unfortunately, prices in the voluntary markets are significantly discounted as compared to those that can be commanded in compliance markets.

Noticeably absent from the list above are the multi-national climate change programs. The European Union Emissions Trading Scheme (EU ETS), for example, does not currently recognize forestry offsets, essentially categorizing them as carbon neutral in the same manner

as nuclear energy. The only other multinational carbon trading program administered by the United Nations under the Kyoto Protocol has very high hurdles for accepting forest-based carbon offsets, essentially making it impractical for landowners to emphasize carbon credit production as a source of revenue. Furthermore, the Kyoto Protocol is set to expire in 2012 and likely will be replaced by a new agreement as an outgrowth of the upcoming United Nations Climate Change Conference (officially called the 15th Conference of Parties or COP15), which will be held in Copenhagen in December of 2009.

This leads to one of the biggest obstacles currently impeding forestland owners from participating in carbon credit markets. A great deal of confusion and uncertainty exists about climate change programs. First, the multiplicity of markets creates confusion as does the fact that each market has its own rules and guidelines for the registration and verification of carbon credits generated by forest-based projects (e.g., see Figure 1 for carbon OTC registries). Most important of all, there is uncertainty about how carbon markets may evolve. For instance, a national cap and trade program may or may not emerge in the United States. If a federal U.S. climate change program does evolve, it will impact the future of all the U.S. carbon markets currently in place (see Table 2). Globally, a new international system may evolve from the 2009 Copenhagen Climate Convention,

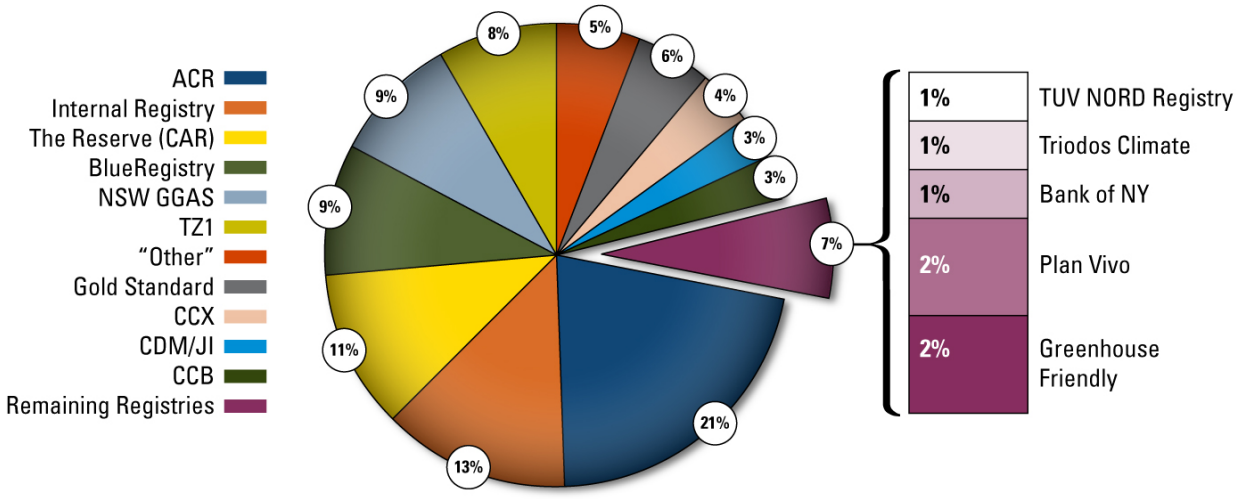

Figure 1. Market share for 2008 of carbon registries for the OTC carbon offset credit market. *Source: Ecosystem Marketplace, New Carbon Finance.*

but the results of that process are yet to be determined. Also, it is not known which countries will be signatories to a new climate change agreement that includes the United States, the world's largest emitter of greenhouse gases.

With carbon markets evolving in a fragmented manner, the lack of uniformity has reduced opportunities for forestland owners to fully participate. Nevertheless, forestry-based carbon credits continue to hold much promise. As carbon markets unify into a single, consistent umbrella system, the sequestration of carbon in forests could become a significant source of income f

Sidebar 2

Size and Pricing of Carbon Markets

- The global carbon market in 2008 totaled US$120 billion, representing 4.2 billion metric tons of CO_2 equivalent ($MtCO_2e$). This is a significant increase from 2007 when just 3.0 billion tons were traded for US$64 billion.[2]
- The voluntary market makes up only a small fraction of the total carbon market, where transactions volume totaled US$705 million in 2008 for 123.4 $MtCO_2e$.
- Carbon offsets command a significantly higher price in compliance markets. In 2008, the EU ETS traded in the 13-29 Euro per tCO_2e range (or 9-20 US dollars).[3] (Note: EU ETS does not accept forest based carbon offsets.)
- In contrast, carbon traded on voluntary markets such as the CCX sells at a large discount to carbon sold in compliance markets, usually around 15 percent of the EU ETS price.[4]
- What is the potential market size of forest based carbon credits? If a U.S. national compliance market emerges, one estimate gives a value of $7.5 billion (assuming a price of $30/$tCO_2e$).

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Monetizing the Opportunity of Carbon Credits for Timberland

A forestland owner can generate cash today by capturing carbon in its trees. The first and most important step is to calculate whether selling carbon credits from a forest actually will add to the net return of a timberland investment. In many cases, that determination will depend on the market price of a carbon credit, with fixed costs and opportunity costs factored into the return analysis. Typical project

development costs alone for forestry-based carbon credits can easily exceed US$150,000.[6] Consequently, there are economies of scale involved, which means the fixed cost to develop forest carbon credits is best spread over a large area of timberland properties.

Earning carbon credits may reduce or eliminate commercial timber harvests – thereby limiting one of the key sources of income from a timberland investment.

In addition to fixed costs, the other important consideration is the opportunity cost. Earning carbon credits may reduce or eliminate commercial timber harvests – thereby limiting one of the key sources of income from a timberland investment. A second opportunity cost is the potential reduction of land values. Future buyers of the property will recognize that its ability to produce harvestable trees or to be developed for real estate may be constrained as long as the carbon credits are in place. Consequently productive forest plantations carry high opportunity costs for carbon sequestration. On the other hand, forests with low growth rates or those that carry harvest or land development restrictions tend to have low opportunity costs. Such examples include wildlife protected areas, wetlands, dedicated recreational areas, areas subject to conservation easements and forested buffer areas adjacent to bodies of water (also known as stream-side management zones or SMZs).

After the analysis is made and it is determined that the production and sale of carbon credits makes financial sense, the timberland owner would follow these steps:

1. **Select the carbon offset market or program.** Again, there are several markets from which to choose, including the over-the-counter (OTC) market, the Chicago Climate Exchange (CCX), and the Regional Greenhouse Gas Initiative (RGGI). Each has its own rules and standards so participating in one may exclude the ability to participate in the others.

2. **Get certified for sustainability.** All carbon credits are required to come from forests that are third-party verified as being sustainably managed. The accepted certification standards for the United States are the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI) and American Tree Farm (ATF) – which is accepted under SFI. All are global certification standards with FSC covering 50 countries and SFI sanctioned by

the Programme for Endorsement of Forest Certification (PEFC), which covers 34 countries.

3. **Set up internal processes for documenting and qualifying carbon credits.** An internal system needs to be developed for measuring, estimating and documenting forest inventory and stored carbon. If the resources are not available in-house, forestry consultants may be engaged to provide this service. Poor execution of this step will raise the risk that the verifier (in step 4) will refuse to approve the carbon credits and demand wholesale revisions.

4. **Hire an accredited carbon credit verifier to authenticate the carbon credits.** Most carbon registries and protocols require verifiers to have IS14065 accreditation.[7] Examples of verifiers include SGS, DNV, First Environment, and BvQi.[5] Verification is not a one-time process. There are periodic checks – usually annually – to confirm that the awarded carbon credits remain valid.

5. **Register the carbon credits.** Have the carbon credits committed to a carbon registry that is accepted by the carbon trading exchange into which one plans to sell.

6. **Sell the credits in the carbon offset market.** In most cases, the forestland owner will not have the means (or scale) to participate directly in the carbon credit exchange; instead the credits are handled by a broker or aggregator who will sell them credits either alone or pooled with other similar carbon projects.

7. **Report regularly on the status of the carbon credit.** As long as the carbon credits remain active, the forestland owner needs to provide regular updates and checks – typically annually – to the registry or the carbon exchange to confirm that the carbon credits are being sustained.

Relevance of Carbon Credits in a Timberland Portfolio

Realistically, the economic justification for selling carbon credits from investment-grade timberland does not exist

for much of the U.S. or worldwide. In the U.S., voluntary markets have kept prices too low; globally, the multinational markets in place today are too restrictive to allow for forest-based carbon offsets.

The future is likely to be different. As they develop, carbon offset credit markets could produce benefits for a timberland portfolio, either directly or indirectly. The direct benefit will be derived by selling carbon credits from a timberland investment property. The indirect benefit will be derived when forestland owners claim carbon credits, which in turn will create higher prices for timber and higher values for timberland. If enough forestland owners participate in carbon sequestration programs, that would reduce the supply of commercial timber, and thus support timber prices. The same could happen if enough energy producers substitute alternative energies for fossil fuels to generate carbon credits. As a consequence, demand for wood as an energy source would rise as fossil fuel use drops, thereby indirectly benefiting timberland investments as well. Fortunately, the indirect benefits are universal; timberland investors would be passive beneficiaries of the resulting higher timber prices regardless of whether they participate in a carbon offset program or not.

Despite the current lack of competitiveness, the future outlook for marketing forest-based carbon credits could change dramatically.

Overall, the best strategy for timberland investors is to consider carbon credits as an opportunistic bonus rather than as a core investment strategy. The recent prices for carbon credits of $2 to $8 for the U.S. cannot generate returns that can compete against the income made from growing and harvesting timber.[8] The possible exceptions are forested areas that have low productivity or that have restrictions on timber harvesting. With low opportunity costs for timber or land returns, such low-growth or restricted forests could be candidates for creating carbon credits. However, it is important to recognize that these are not the type of forests that an investor would normally acquire for a timberland portfolio.

Despite the current lack of competitiveness, the future outlook for marketing forest-based carbon credits could change dramatically. At this point, the recommendation is to take a wait and see approach until there is stability and clarity on public policy regarding climate change and cap and trade. Otherwise, a timberland investor may spend a lot of capital and resources on a carbon credit strategy only to see the rules of the game change over the course of the investment. The U.S. could potentially

adopt a national carbon cap and trade system, which may or may not be linked to a multinational climate change program that succeeds the Kyoto Protocol. Given that timberland typically has an investment horizon that runs from 8 to 12 years, or longer, such risks of the rules evolving in the climate change milieu are quite high.

2. Conservation Easements

In contrast to carbon credits, the market for conservation easements is well-established. Landowners use conservation easements to sell or donate certain rights associated with a property for the purpose of protecting its environmental values. This may be a restriction to subdivide the property or to prevent its development. The transfer of such rights is achieved through a legally-binding agreement (the easement) between the landowner and a qualified conservation organization or public agency.

The idea that property consists of a "bundle" of rights and that a landowner can transfer parts of that bundle is rooted in hundreds of years of English common law and this framework was adopted into the U.S. legal system. The first conservation easement in the U.S. probably was established in the late 1880s.[9] However, it was not until the 1980s that conservation easements emerged as a popular, market-based means for conservation groups and public agencies to protect environmentally-sensitive areas on private lands. Easements are the tool of choice for the estimated 1,700 land trusts operating in the United States. Land trusts are non-profit organizations that conserve land by purchasing easements or fee-simple title of property. They also are known to serve as transaction conduits between private landowners and government agencies interested in acquiring property. Between 2000 and 2005, the number of conservation easements purchased by, or donated to, land trusts in the U.S. doubled to 6.2 million acres.[10]

There are certain notable features about conservation easements that timberland investors should know about. First, each conservation easement is unique and tailored to each property. The transfer of rights will differ depending upon what the landowner wishes to give up and what features of the property the conservation group wishes to protect. A conservation easement, for instance, may be crafted to allow for forest management

and harvesting, thus enabling the owner to continue to generate timber income from the land. From that perspective, the advantage of conservation easements is that they can offer great flexibility. The downside is that an easement is not a fungible asset, like a carbon credit. Its lack of standardization means there is no tradable market. Each conservation easement is created through one-on-one negotiations between the landowner and a conservation group.

Another key feature of note is that regardless of which rights are relinquished in an easement, the landowner still retains ownership of the property. While an easement may be granted with a fixed lifespan, most conservation groups and agencies are only willing to accept easements that are held in perpetuity. Hence, when the land is sold, its future owners are bound by the easement's terms. Given the permanence of easements, a forestland owner should keep in mind that amending an easement after it is signed is very difficult. The only time a significant alteration is granted under a court of law is when it can be proven that the original intent of the easement is no longer valid. A landowner should therefore be certain of what he or she is getting into before signing an easement.

Autumn foliage on the Cumberland Plateau of Tennessee. Preserving scenic beauty can be a key driver in creating conservation easements.

Finally, those that acquire easements, whether they be land trusts or public agencies, are responsible for their enforcement. Monitoring is performed on a regular basis, typically once a year, to ensure that management is adhering to the conditions of the easement. For that reason, many land trusts establish endowments to allow for the continued stewardship of the easements they hold.

Monetizing the Opportunity of Conservation Easements for Timberland

Unlike timber harvests or carbon credits, a landowner's capacity to sell conservation easements tends to be limited. Typically, only a select subset of a forest's land base has the right environmental attributes to make purchasing an easement of interest to a land trust or government entity. The investor's timberland manager may identify these resources and quantify their marketability. In other instances, it may be the conservation group or a governmental agency that opens talks with the landowner about acquiring an easement. Regardless, after the identification of potential conservation values on the property, the

process of monetizing them through the sale of a conservation easement entails the following steps:

1. **Initiate contact with counter party.** If the forestland owner identifies a potentially valuable environmental asset on its property, the first step is to seek state or local conservation groups – usually a land trust – that may show interest in acquiring an easement. Alternatively, as is mentioned above, it may be the public agency or conservation group that initiates contact with the landowner.

2. **Seek legal consultation.** Property laws are the domain of states. Each state has its own laws governing conservation easements. After mutual initial interest is set, but before negotiations begin in earnest, the landowner should consult an attorney as to the laws of the residing state and the legal and tax implications of a proposed easement sale.

3. **Land trust will assess suitability for an easement.** Before terms of the easement can be defined, the conservation organization will conduct a thorough assessment of the land and the natural resources to objectively define what environmental assets or services exist and what levels of protection they require. Examples could include scenic beauty, clean water, migration routes, and buffer areas for wildlife habitat. Experts representing the land trust, such as biologists, anthropologists, hydrologists and geologists, may visit the property for purposes of assessment.

4. **Negotiate terms of the conservation easement.** Easement values vary greatly. Generally speaking, the more restrictive the conservation easement, the greater the compensation that can be commanded by the landowner.

5. **Seek an appraisal and confirm that expected net life-of-investment returns are additive.** Once the general terms of the conservation easement are defined, the property to be encumbered is normally appraised by a third-party. The appraisal should include two valuations: (1) value of the property unencumbered by the easement, and (2) value

of the property under the restrictions of the easement. Knowing these two appraised values, confirms that the life-of-investment return with the sale of the easement is at least equal to, if not higher than, the base scenario of not selling an easement.

6. **Execute the conservation easement.** Understand that the land trust will periodically check to ensure that the conditions of the easement agreement are being met.

Conservation easements are best seen as a post-purchase, opportunistic contributor to a timberland portfolio's investment returns.

Relevance of Conservation Easements in a Timberland Portfolio

Given the very unique, site-specific nature of conservation easements, it is difficult to create a proactive portfolio strategy based on returns generated from the sale of conservation easements. Identifying and correctly valuing conservation easements at acquisition is difficult, as the investor is not able to project with reliability how much, if anything, a conservation group or public agency may pay for conservation values before negotiations begin.

Conservation easements are best seen as a post-purchase, opportunistic contributor to a timberland portfolio's investment returns. That, however, does not mean the investor should play a passive role. All timberland properties acquired for a portfolio should be thoroughly examined for any conservation values that could be monetized through the eventual sale of an easement. Active communication and the cultivation of relationships with conservation groups can facilitate the sale of easements based on those conservation values. Without that active pursuit by the investor, there could be missed opportunities for higher investment return when potential conservation easements are (a) overlooked; (b) belatedly indentified; or worse, (c) captured by the next landowner after the investment is sold.

3. Mitigation Banking

Overview

Our ecosystems provide a variety of services and values to society. If such values become endangered, one solution is to protect them. Should that not be practical, the alternative is to compensate or offset the loss with a replacement of equal value. Therein lies the concept of ecosystem mitigation banking.

State and federal laws often require that when certain types of ecosystems are lost or damaged because of development or other types of land uses, those losses must be offset by the equivalent replacement or improvement of an ecosystem located somewhere else.

A market for mitigation banking normally arises when a developer needs to secure government approval or permits to develop an area that will cause the loss of some protected ecosystem service. To receive clearance, the developer must mitigate the lost ecosystem asset with a comparable environmental service elsewhere. In that regard, the process is analogous to what occurs in the carbon offset market; damages to an ecosystem service are "offset," thereby creating a "no-net-loss" condition. As carbon offsets prevent no net gain in carbon emissions, mitigation banking prevents no net loss of ecosystem values and services.

In the United States, mitigation banking markets primarily exist for three types of ecosystem services: wetlands, streams, and endangered species habitat. Table 3 below shows the government policies that drive these mitigation markets.

Table 3. Source U.S. laws that govern mitigation banking of various ecosystem services

Ecosystem Service	Policy Drivers for Mitigation Banking
Wetlands	Clean Water Act State Wetland Laws
Streams	Clean Water Act
Endangered Species Habitat	Endangered Species Act State Endangered Species Law

Compared to carbon credit markets, there are several important complexities associated with mitigation banking. Most prominent among these is the fact that an ecosystem is not a fungible asset like a carbon credit. *Where*, *how* and *by whom* a ton of carbon is emitted into the atmosphere is not important. A ton of carbon is the same everywhere. That is not the case for mitigation banking. When and where an acre of endangered species habitat, or a wetland, is destroyed or created *does matter*. Measures of what constitutes a successfully re-created wetland, stream or habitat is complicated. It is not an acre to acre measure: species diversity, hydrologic functions, vegetation cover and a host of other factors come into play. These issues of ambiguity and complexity make mitigation banking a very different type of market than the markets for carbon offset credits. Relatively speaking, mitigation banking of wetlands or habitat carries a lot of financial risk for a timberland owner, but in turn, it also can offer strong opportunities to create great financial rewards.

Example of a wetland

Monetizing the Opportunity of Mitigation Banking for Timberland

Before embarking on a mitigation banking strategy within a timberland portfolio, three criteria must be met:

1. **Confirm that market demand for mitigation banks exist.** Markets for most mitigation banks are highly localized; that is, wetlands, streams or endangered species habitat to be included in a bank usually are in fairly close proximity to those that are being lost or damaged. Otherwise the replacement ecosystem will not properly offset the environmental services being destroyed by development. In that regard, during the timberland acquisition due diligence process, it is important to analyze whether there are clear indications of development activity in environmentally sensitive areas surrounding lands targeted for purchase. If so, that could be an indicator that demand for mitigation banking could exist or develop. Obviously, the clearest indicator of demand is when developers initiate contact with the forestland landowner in an effort to identify mitigation banking opportunities.

2. **Validate that the property is suited to create wetland, stream or wildlife habitat.** Only certain types of forestland can qualify to become wetlands, streams, or habitat. For example, a forest must be in the same watershed service area as the wetlands being subject to loss by development. Knowing whether a property is suitable for mitigation may require the assessment of experts such as biologists, hydrologists, and soil scientists.

3. **Have the risk appetite and sufficient long-term capital to commit to the project.** All mitigation banking projects require a large, up-front investment of capital with a fairly long maturation period. Payback periods can be two years to five years out, or sometimes longer. Due to numerous contingencies to success, investors must have a high tolerance for risk.

Sidebar 3

Payout Schedule of a Wetlands and Stream Mitigation Bank[12]

- A mitigation project will have a fixed number of credits that can be sold into the mitigation bank. After receiving government approval and the requisite permits for a mitigation banking instrument (MBI), up to 15 percent of those credits can be released.
- No additional credits can be released during the construction of the mitigation bank.
- After the mitigation bank is fully constructed, it will take two successful growing seasons of vegetation for the remaining credits of a wetland bank to be released. A stream bank takes longer with 10 to 25 percent of the credits freed each year until all of the credits are released.
- Even after the credits are released, the responsibilities of the owner are not over. Monitoring is required in years 1, 2, 3, 5, 7 and 10 following the end of the first growing season.

Investors in mitigation banks generally expect three-times (3x) their investment. The expected payout is higher for stream mitigation than wetlands mitigation due to the higher risks involved.[11] Size also is a factor. The larger the area proposed for inclusion in a mitigation bank, the higher the expected profit margin.

There are four ways for a timberland investor to participate in mitigation banking. They are:

1. Take a fee-simple property and create a mitigation bank independently.

2. Create or acquire an easement on forestland from which a mitigation bank will be created. From that easement, sell mitigation rights to a developer. The developer is responsible for constructing a mitigation bank from the easement. The forestland owner will share in the profit with little or no risk.

3. Form a joint venture partnership with a firm specializing in the development of mitigation banks. In this case, revenue and risks associated with the establishment of the bank are shared.

4. Acquire an existing or partially completed mitigation bank.

Most mitigation banking credits are withheld until there is verification that the mitigation bank is functioning as intended (see sidebar 3). Be aware that mitigation banks are designed to exist into perpetuity. They are encumbered by permanent deed restrictions, which means all development and mineral rights are relinquished by the landowner. It is important to

understand that such restrictions will impact future value when the property with the mitigation bank is sold.

Relevance of Mitigation Banking in a Timberland Portfolio

Mitigation banking is a proven and established market. However, it is a niche market. Only a limited amount of forestland in the United States is suited to become new wetland, stream or endangered species habitat. Furthermore, the demand for such mitigation banks is dwarfed by the much larger and more extensive markets for wood biomass, conservation easements and recreational leasing. Therefore, the amount of capital that can be successfully placed into a timberland investment strategy that centers on mitigation banking is modest at best. A capital allocation above US$100 million for mitigation banking will be difficult to execute. A more acceptable level is below $40 million.

Given the complexity associated with creating mitigation banks, a suggested business model is for the investor's timberland manager to partner with companies that specialize in mitigation banks. The partner firm will seek opportunities and manage the creation of the mitigation bank. The investor will provide the capital to acquire the property and fund the mitigation banking projects.

Flock of wild turkey in the woods.

4. Recreational Leasing

Forests can provide physical products such as wood, clean water and captured carbon, but they also can provide a variety of services that are enjoyed by society, such as recreation. Public forests alone cannot meet this demand. Therefore, recreationalists often are willing to pay for the opportunity to enjoy activities on private forestland. These range from, but are not limited to, birding, caving, rock-climbing, hiking, fishing and hunting. Wildlife recreation is arguably one of the largest ecosystem markets. A 2006 survey by the U.S. Fish and Wildlife Service estimated that 87 million Americans hunt, fish or view wildlife while spending more than $120 billion a year on such pursuits.[13]

The most common method for consumers to enjoy forest activities on private land is through a recreational lease. In broad terms, a recreational lease grants the paying consumer the right to enjoy a specified recreational activity on the landowner's property for a certain period of time for a pre-established fee. While a wide range of recreational markets exist, the most popular type of

agreement employed on private forestland in the United States is the hunting lease. Legally, landowners do not own native wildlife. Wildlife is publically owned by the state and therefore cannot be leased or sold by a landowner. Landowners, however, can control access to their properties, and therefore determine who can hunt.

The hunting lease market is big business. More than 80 percent of all hunters in the U.S. rely on private lands to hunt and they spend more than $740 million a year to lease land.[13] Of that amount, more than $360 million is spent on big game hunting leases, such as deer.[13] Other popular types of wildlife hunted under leasing arrangements include waterfowl, wild turkey, quail, and doves.

Hunting leases can be short-term or long-term and can be for daily, seasonal or multi-year use. Short-term leases generally can be more lucrative, but they entail more effort and marketing by the landowner. An important benefit of long-term leases is that hunters can help patrol and look after an investor's property. This has been shown to reduce trespassing, vandalism and timber theft.

A hunter with a wild turkey

An important consideration about the private wildlife recreational market is that its acceptance is not universal and market demand varies by region. Certain areas such as the U.S. Southeast and the U.S. West have established traditions of private landowners charging for recreational activities under leasing arrangements. Other regions, like the U.S. Midwest and the U.S. Northeast, have cultures more adapted to free access by the public. In these regions, there is a degree of social stigma associated with limiting entry to one's lands and demanding payment. Nevertheless, these norms are gradually changing. Markets for private recreational leases are expanding across all parts of the U.S. and globally as well.

Monetizing the Opportunity of Recreational Leasing for Timberland

There are exceptions, but recreational leasing is considered a supplemental source of income, not a primary driver of investment return. Unless a property has exceptional recreational opportunities, timberland investment decisions are rarely driven by their ability to

generate leasing revenue (see Sidebar 4 for a picture of typical lease rates.)

Once a timberland investment is made, the investor should assess the recreational resources on the property. This includes determining the presence and abundance of game and fish species. It also is important to determine if the property consists of parcels of sufficient size to allow for the recreational activity to occur. Hunting leases can range from 20 acres to several thousand acres, depending upon the type of game being hunted. Waterfowl and dove hunting require fewer acres, while quail and deer hunting necessitate access to larger tracts.

Performing habitat management and adding amenities often improves a property's desirability among recreationalists and this usually enables landowners to charge higher leasing fees.

Performing habitat management and adding amenities often improves a property's desirability among recreationalists and this usually enables landowners to charge higher leasing fees. For example, adding food plots, tree stands, and blinds to a property can improve deer hunting. Concurrently, it is important to understand that all forest management practices affect hunting and other recreational opportunities. Activities used in commercial forestry such as timber harvesting, planting, weed control, burning, fertilization, and road maintenance all have an impact on wildlife populations, which in turn, affects the value and terms of a recreational lease. Consequently, recreational lease management should not be separated from forest management. Both should be coordinated to generate the highest net gain from timber income and recreational lease proceeds.

Recreational leases can be managed (1) internally by the investor's timberland investment manager or (2) though a specialized lease contractor. In the later case, the outside contractor or broker usually markets and administers the leases for a percentage of the leasing revenue.

Sidebar 4

The Income Potential of Hunting Leases

- The rate at which a forestland owner can charge for a hunting lease depends on a variety of factors, including: (1) size and location of property; (2) type of game; (3) quality of habitat and hunting experience; (4) reputation of the operation; (5) number of participants in the lease; (6) length of the lease; and (7) type of services facilities and amenities the landowner provides.[13]
- If administered well, hunting lease income often can cover the property taxes of the forestland property and potentially more.
- Many hunting lease rates in the Eastern U.S. fall in the range of $4 to $10 an acre per year. Deer and turkey usually fall within the range of $3 to $10. However, high quality white-tail deer hunting areas can sometimes generate $25 to $30 per acre. On the other hand, leases for small game can be as low as $1 per acre. Waterfowl leases can command as much as several thousand dollars for prime locations.[14]

Relevance of Recreational Leasing in a Timberland Portfolio

A timberland investor should consider recreational leases as a potential contributor of return for many (but not all) timberland investments. Again, opportunities are prevalent in the U.S. South., but less so in the U.S. Northeast and Midwest. As a general rule, recreational leases can add about 15 to 60 basis points of return to a U.S. based timberland portfolio. While that cannot compare with returns generated from timber harvesting and land dispositions, it can still have a meaningful impact on financial performance. Investment return is enhanced and risk is reduced as recreational leases are uncorrelated with timber markets.

Despite their benefits, recreational leases should not be a primary investment strategy for a timberland portfolio. Any property that generates most of its income from recreation cannot truly be considered a timberland investment - in part because of the levels of infrastructure and management required to operate it. In reality, such an investment would be more a resort-style private equity or real estate play. Consider for illustration a rainforest property in Brazil that offers ecotourism. If ecotourism generates more income than does timber harvesting, then the investment should be

classified as a tourism-based asset rather than a true timberland asset. That is because its financial characteristics, such as (a) correlation to other asset classes, (b) risk level and (c) return expectations will bear little resemblance to what is expected from investment-grade commercial timberland.

Touching on International Opportunities

Markets for ecosystem services vary from one country to another, but taken on a global scale, they are expanding.

Carbon Credits

Internationally, carbon credit markets are in a state of flux. As was previously explained, the Kyoto Protocol will expire in 2012 and a new climate change treaty will likely emerge to replace it, possibly as a result of the UN Climate Conference to be held December of 2009 in Copenhagen. Until details emerge on a new global climate change program, it is best for investors to wait before considering carbon offset credits as a viable revenue generation option within a timberland portfolio. Current pricing levels for carbon credits are too low to compete with timber harvest income for most commercial timberland investments.

Conservation Easements

The United States may have originated the conservation easement instrument, but other countries are adopting it as an important conservation tool. Land trusts and public agencies have successfully expanded the use of conservation easements in Canada, Latin America, Australia and the Caribbean.

Mitigation Banking

The prospects for forest-based mitigation banking outside the United States are limited. Many emerging countries lack the environmental laws and frameworks necessary to produce market-based conservation solutions that focus on preserving ecosystems in exchange for planned development. As for industrialized economies such as those in Western Europe, there is little private commercial timberland located in areas where mitigation banking might take place.

Recreational Leases

Markets for forest-based recreational leases are highly variable among countries, but generally speaking, they lack the depth and breadth of North American markets. Many parts of the world do not have cultures or traditions of charging fees to access private property for recreation. Furthermore, most emerging markets do not have sufficiently large middle-class demographics to support a forest recreational market. However, as the global economy grows and household income rises, the demand for forest amenities and leisure is likely to increase.

Summary and Recommendations

The overall picture of ecosystem services from the perspective of a timberland investor is summarized in table 4 below.

Table 4. The expected overall contribution of net investment return by an alternative forest market for a typical U.S. focused timberland investment portfolio.

Non-Traditional Forestry Market	Timberland Portfolio Applicability	Contribution to Return: Current Potential	Contribution to Return: Future Potential 2-5 years
Carbon Credits	Limited opportunities now, but may change in the future	✓	???
Conservation Easements	Moderate applicability for a portion of a diverse portfolio	✓	✓✓
Mitigation Banking	Must proactively pursue a limited set of opportunities	✓	✓
Recreational Leasing	Broadly applicable to many investments in the U.S.	✓✓	✓✓

Key	Contribution to Investment Return for a Portfolio of Timberland Investments		
✓	Limited	< 20 bp	Exceptions will occur, but this sector is not expected to provide more than 20 bp of investment performance for the majority of timberland portfolios.
✓✓	Fair	20 - 100 bp	Could contribute 20 to 100 bp of total returns, although some opportunities exist to exceed those levels.
???	Unknown	? bp	Assessment of this market is too difficult due to dependence on future public policy development.

DISCLAIMER: The table above expresses only the educated opinion of the author. Realization of returns is dependent upon many factors, some of which are outside the control or prediction of the investor or the timberland asset manager. The views of investment performance presented in this table are no guarantee, explicit or implied, of an investor's actual performance.

There are three ways to capitalize on ecosystem services opportunities within a portfolio of timberland investments: (1) development of a portfolio strategy; (2) purchase of timberland properties; and (3) management of timberland assets.

Development of a Ecosystem Service Portfolio Strategy

Before a single dollar of capital is placed into a timberland investment, an investor should lay the groundwork for how ecosystem services will be exploited to support the investment goals and objectives being pursued. That means first knowing one's (1) return expectations; (2) investment horizon; (3) cash flow needs; (4) risk appetite; and (5) need for diversification with other asset classes in the overall portfolio. Knowing these five investment objectives will help define what potential roles alternative forest markets can serve in a timberland portfolio. An investor with a higher risk tolerance, for instance, may be more open to mitigation banking. An investor with long investment horizons may be more amendable to producing and marketing carbon credits due to the long-term nature of getting a forest through certification, registration, and verification of carbon sequestration. On the other hand, an investor who favors higher cash yields may want to focus on recreational leases.

An investor should be proactive, not reactive, in its environmental market strategy. That is because the portfolio can have additive or synergistic effects as the

investor adds properties featuring that ecosystem service. Many environmental services need a minimum threshold level to be effective and to benefit from economies of scale. A case in point is forest carbon credits. Their high fixed cost is due to registration and validation requirements, but these costs can be spread over large areas.

Regional demographics can have a significant bearing on how wildlife recreation markets, conservation easements and mitigation banking develop.

The interactive effects can extend across markets as well. In other words, ecosystem services can either complement or substitute with other markets. Some markets are additional: they enhance each other. Conservation easements and recreational leasing fit well with each other, for example. However, just as there are complementary markets, there can be subtractive markets as well. Several ecosystem services do involve tradeoffs; it is not always a win-win. Pursuing carbon offset credits can reduce timber harvest income for instance. Carbon credits and bioenergy production also are not mutually reinforcing activities because renewable energy credits (RECs) and carbon offset credits cannot be sold from the same project.

The takeaway message is that employing an *ad hoc*, reactive strategy of buying timberland without considering the synergistic and interactive effects of traditional and alternative ecosystem markets can produce sub-optimal investment performance. An investor should clearly define the investment goals for timberland and build a strategy that integrates all of the complementary and negative market effects together.

Acquisition that Considers Ecosystem Markets in the Valuation

The next way to capture opportunities in ecosystem services is through careful property acquisition. When valuing prospective timberland purchases, it is important to measure all the risks and sources of income that will be derived from timber, land and ecosystem services.

For instance, regional demographics can have a significant bearing on how wildlife recreation markets, conservation easements and mitigation banking develop. Does the per capita household income in the area and the proximity to urban areas support demand for recreational services? Is the property near a watershed with wetlands that are under developmental pressure? Are there active conservation groups in the region that are well funded and that have a track record of

purchasing conservation easements similar to those considered for purchase? An astute investor needs to recognize and estimate demand for all possible ecosystem services in the region to make the right investment choices at purchase. The goal is (1) not to be overly optimistic so as to avoid over-paying for a property, yet (2) not underestimate the ecosystem service market potential and lose out on a good investment.

Management of Forest Investment

After a timberland investment is added to a portfolio, management of the property should be adapted to the market opportunities in the area. For instance, if the forest property is in an area where white tail deer hunting is popular, then it may be managed to increase the deer population and feature amenities for hunters to increase the hunting lease rates.

Some ecosystem service markets could shift dramatically for better or worse over the course of the investment term of a timberland investment. Timberland should not be considered a passive investment with only a purchase and sale decision. Ongoing management should be adaptive and should respond to the various timber and environmental markets that are accessible to maximize return.

Conclusion

Ecosystem service markets have grown to the point where they can have, and will continue to have, a measureable impact on timberland investment returns. The challenge for investors is to be positioned to take advantage of them in ways that support their pursuit of higher returns, but to do so in a manner that is commensurate with their risk tolerance

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