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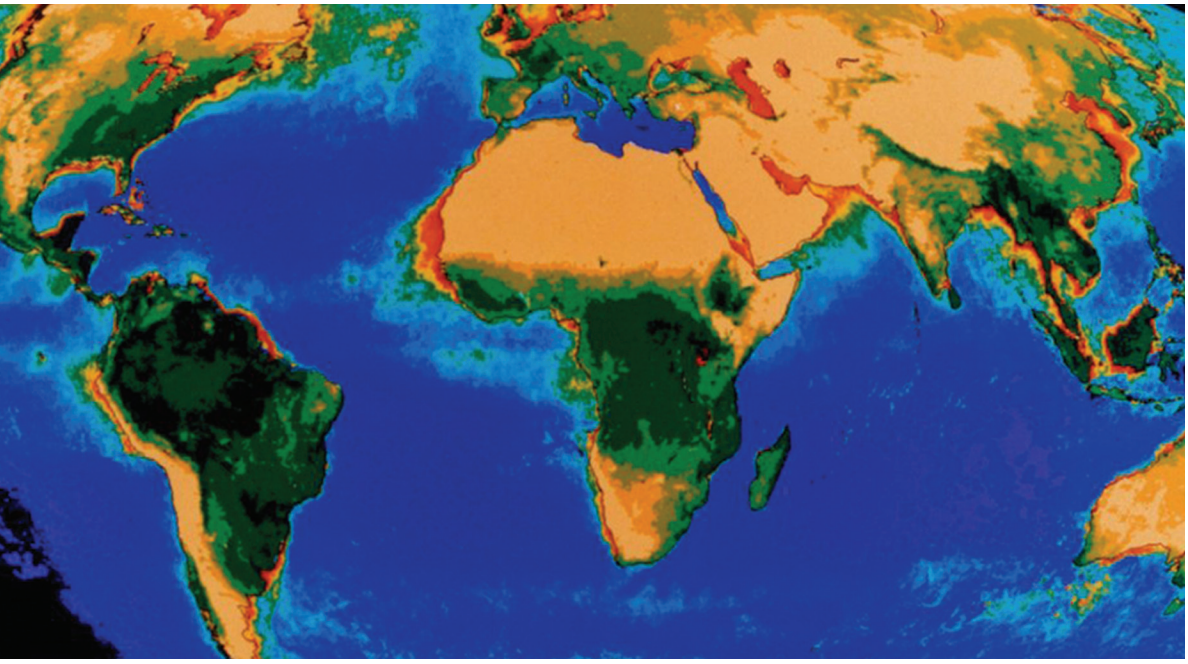
Investing in Forest Carbon:
Lessons from the First 20 Years

The Katoomba Group, Ecosystem Marketplace and
Forest Trends with input and support from Bio-Logical Capital

January 2011



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Forest Trends' (http://www.forest-trends.org) mission is to maintain, restore, and enhance forests and connected natural ecosystems, life-sustaining processes, by promoting incentives stemming from a broad range of ecosystem services and products. Specifically, Forest Trends seeks to catalyze the development of integrated carbon, water, and biodiversity incentives that deliver real conservation outcomes and benefits to local communities and other stewards of our natural resources. Forest Trends analyzes strategic market and policy issues, catalyzes connections between producers, communities and investors, and develops new financial tools to help markets work for conservation and people.

The Katoomba Group (http://www.katoombagroup.org) is an initiative of Forest Trends. It is a global network of practitioners working to promote the use of and improve capacity for payments for ecosystem services (PES). The Katoomba Group addresses key challenges to developing markets and payments for ecosystem services, confronting issues ranging from enabling legislation through establishment of new market institutions to testing methods for successful project design. The Katoomba Group has convened numerous global conferences and training workshops, published and contributed to a range of key publications and tools around policy, legal and technical issues, and helped incubate the development of a range of new PES schemes, including the BioCarbon Fund at the World Bank and the Mexican PES Fund. The Katoomba Group has also advised policy discussions on financial incentives for conservation in numerous countries including Brazil, China, Colombia, Ghana, India, Peru, and Uganda.

The Ecosystem Marketplace (http://www.ecosystemmarketplace.com), a project of Forest Trends, is a leading source of news, data, and analytics on markets and payments for ecosystem services (such as water quality, carbon sequestration, and biodiversity). By making accessible information on policy, finance, regulation, science, business, and other market-relevant factors, markets for ecosystem services will one day become a fundamental part of our economic system, helping give value to environmental services that, for too long, have been taken for granted. Providing free reliable market information can facilitate transactions (thereby lowering transaction costs), and also catalyze new thinking, spur the development of new markets and the infrastructure that supports them, and achieve effective and equitable nature conservation.

Bio-Logical Capital (http://www.biologicalcapital.com) is a land investment, development, revitalization and conservation company. We deliver lasting value and strong returns by investing for the long term and integrating sustainable land-based businesses, like renewable energy, real estate and agriculture, with ecological restoration and conservation. We call this approach *Stewardship Development*. We restore significant lands and support vibrant communities by deepening people's relationship with the land and the value it creates. We learn from and unleash the power of nature to enrich lives and land.

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The findings in this report are based on over 50 in-depth, one-on-one interviews with forest carbon leaders, who represent the full array of players in the forest carbon market—from investors through standard-setters, project developers, and sellers—as well as the ongoing extensive research that goes into the annual *State of the Voluntary Carbon Market* reports and the *State of the Forest Carbon Markets 2009* report.

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A Note about this Publication

This report seeks to provide insights on forest carbon transactions. It complements other Forest Trends publications on carbon markets and transactions, including the annual *State of the Voluntary Carbon Market* reports, the *State of the Forest Carbon Markets 2009* report, and 'how-to' manuals, such as *Payments for Ecosystem Services: Getting Started* and *Building Forest Carbon Projects: A Step-by-Step Guide*. We urge readers to refer to these other documents for insights on the state of the forest carbon markets and transactions as well as more details on developing forest carbon projects.

This report is based on a broad set of interviews that were conducted in the spring of 2010 as well as responses to a survey for *The State of the Forest Carbon Markets 2009* report.

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Executive Summary

The first carbon offset sales from forestry projects occurred as early as 1990. Over the past two decades, a diverse marketplace has developed. Despite limited regulatory drivers, this development has included the establishment of some industry infrastructure—legal and political frameworks, project standards and methodologies, and expert resources. While much of this infrastructure was developed in the voluntary carbon market, more regulatory certainty is needed for the marketplace to transition from an emerging to an established market. This report reviews past and current forest carbon projects to lay out lessons and important information for the way forward.

- *For over twenty years, forest carbon projects have been implemented to mitigate climate change—with more than 20.8 million tons of carbon dioxide ($MtCO_2$) transacted.*[1]

  Trees absorb carbon and release oxygen. By planting trees and ensuring that forests are not cut down, carbon stocks are maintained on the landscape rather than being dispersed into the atmosphere. This fundamental dynamic has been the underlying rationale for investors, project developers, and landowners who engage in forest carbon projects and other land-based practices that sequester carbon, such as changing agricultural and grazing practices.

- *Despite over 200 forest carbon projects developed, there are too few global, independent analyses.*

  To address this gap, Forest Trends' Ecosystem Marketplace and Katoomba Group, in collaboration with Bio-Logical Capital, have undertaken this review of what lessons can be learned from the development and implementation of forest carbon projects to date. Our findings are based on an extensive literature review and over 50 interviews with stakeholders, including investors, project developers and organizations engaging with individual landowners. We have also incorporated the extensive survey research that was conducted for the Ecosystem Marketplace's annual *State of the Forest Carbon Market* report. The resulting report synthesizes the lessons learned through existing projects and offers a view on forest carbon markets today.

- *Our findings indicate that forest carbon investments have faced numerous challenges.*

  The key risks identified by stakeholders include (1) uncertainty around whether or not regulatory markets will include forest carbon, which has adversely affected demand, (2) a lack of clarity on legal issues associated with project design and transactions, and (3) a lack of approved methodologies for measuring forest carbon in the voluntary market. Additionally, projects have difficult cash requirements, with high pre-development costs for carbon measurement and forest management plans that are borne prior to an accurate assessment of potential revenues.

- *Overall, these challenges have resulted in a lack of clarity on assessing expected returns, time horizons, and risks.*

  Investors predict both opportunity and continued risks. Currently, rules around how to nest projects within national accounting frameworks are emerging; new standards and methodologies are in development; price discovery is still in process; and governance remains an emerging area of practice. In spite of this

[1] Hamilton, K., Chokkalingam, U., and M. Bendana. 2009. *State of the Forest Carbon Markets 2009: Taking Root and Branching out.* Washington, DC: Forest Trends, Ecosystem Marketplace. (http://forest-trends.org/publication_details.php?publicationID=2384).

uncertainty, investment in forest carbon projects has continued. There are continued transactions in the forest carbon markets[2] as well as new forest carbon investments made by multilateral and public sector particularly related to REDD (reducing emissions from deforestation and degradation). It remains to be seen whether key up-front costs will continue be borne primarily by philanthropic and public sector sources, or whether the private sector will engage more actively and broadly.

- *Fortunately, risk mitigation strategies are better than before and project screening criteria is more robust, and thus investors have an opportunity to be part of forest carbon market development as the standards, rules, and best practices are being defined.*

  A particularly ripe area of engagement is around financing mechanisms that offer investors appropriate enticements to take the risk of providing early forest carbon project funding. This would allow them to share in the rewards, as forest carbon matures as an investment class and risks decrease in the coming years. With clear standards emerging and institutional capacity growing, forest carbon could be adopted into regulatory policies and could transition from an emerging to an established market.

[2] For the most up-to-date information on forest carbon transactions, please see the Ecosystem Marketplace's Forest Carbon Portal (http://www.forestcarbonportal.com).

Glossary

AAU	Assigned Amount Unit
ACR	American Carbon Registry
AFOLU	Agriculture, Forestry, and Other Land Uses
ALM	Agricultural Land Management
A/R	Afforestation/Reforestation
ARR	Afforestation, Reforestation & Revegetation
CAR	Climate Action Reserve (also known as The Reserve)
CCAR	California Climate Action Registry
CCB	Climate, Community, and Biodiversity
CCBA	Climate, Community, and Biodiversity Alliance
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CFS	CarbonFix Standard
CO_2	Carbon Dioxide
CRT	Climate Reserve Ton
CSA	Canadian Standards Association
ECCM	Edinburgh Centre for Carbon Management
ECOSUR	El Colegio de la Frontera Sur
EPA	Environmental Protection Agency
ERT	Environmental Resources Trust
ERT	Emissions Reduction Ton
EU ETS	European Union Emissions Trading Scheme
FSC	Forest Stewardship Council
GHG	Greenhouse Gas
IFM	Improved Forest Management
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
JI	Joint Implementation
LULUCF	Land Use, Land-Use Change and Forestry
MER	Markit Environmental Registry
$MtCO_2$	Millions of Tons of Carbon Dioxide Equivalent
NGO	Non-Governmental Organization
NSW GGAS	New South Wales Greenhouse Gas Abatement Scheme
NZ ETS	New Zealand Emissions Trading Scheme (NZ ETS)
OTC	Over-the-Counter (market)
PDD	Project Design Document
REC	Renewable Energy Certificate

REDD	Reducing Emissions from Deforestation and Degradation
REDD+	Reducing Emissions from Deforestation and Degradation; "plus" (+) includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
REDD++	Reducing Emissions from Deforestation and Degradation; "plus plus" (++) refers to a broader suite of all land uses including afforestation, agriculture, and peat land management
tCER	Temporary Certified Emission Reduction
tCO_2	Ton(s) of Carbon Dioxide Equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCU	Voluntary Carbon Unit
VER	Verified Emission Reduction
VERR	Verified Emission Reductions-Removals
WRI	World Resources Institute
WBCSD	World Business Council for Sustainable Development

Introduction

Forestry projects were the source of the first carbon offsets almost twenty years ago. Some of these earliest projects were developed as testing grounds for sequestration and innovative environmental finance mechanisms. These projects taught early project partners the complexities, risks, and methodologies of creating offsets. Although forestry transactions were the very first carbon offsets, they were soon sidelined by emerging global greenhouse gas (GHG) regulations.[3] They have continued, however, to be developed and transacted, primarily in voluntary markets. With regards to forest carbon overall, as of January 2010, the Ecosystem Marketplace's *State of the Forest Carbon Markets 2009*[4] survey documented 226 forestry projects across 40 countries that have transacted carbon credits. While this figure is small in comparison to the overall carbon market, it still represents a significant number of projects and experiences—which are becoming increasingly pertinent as forest carbon draws more attention from climate analysts and policy makers.

Forest carbon has the potential to play an important role in climate mitigation. Scientists assert that land-use changes, including deforestation, account for 15% to 20% of carbon dioxide (CO_2) emissions.[5] Other reports, including *The Stern Review*, the Eliasch Review, and research by McKinsey and Company support the halting of deforestation as a critical and cost-effective means of reducing global GHG emissions.[6]

Political interest in forest carbon is also on the rise. Last year's 2010 United Nations Framework Convention on Climate Change (UNFCCC) negotiations in Cancun resulted in an initial framework for REDD. The United Nations states that "financial flows from greenhouse gas emission reductions from reducing emissions from deforestations and degradation (REDD) could reach up to $30 billion a year."[7]

In light of this context, it is timely to assess the lessons learned over the last twenty years related to multiple types of forest carbon. This report first describes forest carbon projects and the forest carbon market. It then presents lessons learned through forest carbon project experiences to date and potential pathways forward.

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[3] The primary reason for forest carbon being sidelined from regulatory markets was controversy around issues such as (1) permanence, or keeping the carbon in the trees over the term of the carbon agreement), (2) additionality, or whether the projects would have occurred without carbon investments, and (3) leakage or spill-over of carbon releasing activities on to other lands.

[4] Hamilton, K., Chokkalingam, U., and M. Bendana. 2009. *State of the Forest Carbon Markets 2009: Taking Root and Branching out*. Washington, DC: Forest Trends, Ecosystem Marketplace. (http://forest-trends.org/publication_details.php?publicationID=2384).

[5] Intergovernmental Panel on Climate Change, 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change 2007. Cambridge, UK and New York, USA: Cambridge University Press (http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html); Rogner H., et al. 2007. "Introduction" in *IPCC Climate Change 2007: Mitigation of Climate Change* (eds. Metz B., et al.): 95-116. Cambridge, UK: Cambridge University Press. (http://www.ipcc.ch/publications_and_data/ar4/wg3/en/contents.html); van der Werf G., et al. 2009. "CO_2 emissions from forest loss." *Nature Geoscience* 2:737-738 (http://biology.duke.edu/jackson/ng09.pdf).

[6] Stern, Sir Nicholas. 2006. *The Stern Review: The Economics of Climate Change.* London, UK: Department of Energy & Climate Change (http://www.hm-treasury.gov.uk/stern_review_report.htm); Eliasch, J. 2008. *Climate Change: Financing Global Forests.* London, UK: Department of Energy & Climate Change (http://www.occ.gov.uk/activities/eliasch.htm); Enkvist, P.-A., Nauclér, T., and Rosander, J. 2007. *A cost curve for greenhouse gas reduction*. McKinsey & Co.

[7] http://www.un-redd.org/AboutREDD/tabid/582/Default.aspx

The Basics

Carbon Markets

Carbon markets trade products that relate to GHG emission allowances, offsets, and reductions. At the broadest level, there are two categories of carbon markets:

- Regulatory markets, which are the main drivers of global carbon trading and are usually linked to cap-and-trade mechanisms imposed by governments, such as the Kyoto Protocol's compliance carbon markets.
- Voluntary markets and voluntary transactions in which companies and individuals without government-mandated obligations can engage in activities to offset their emissions, for example through projects that meet the Voluntary Carbon Standard (VCS) and/or the Climate, Community, and Biodiversity (CCB) Standards for projects with 'co-benefits'.

Box 1: Current Markets for Forest Carbon Transactions

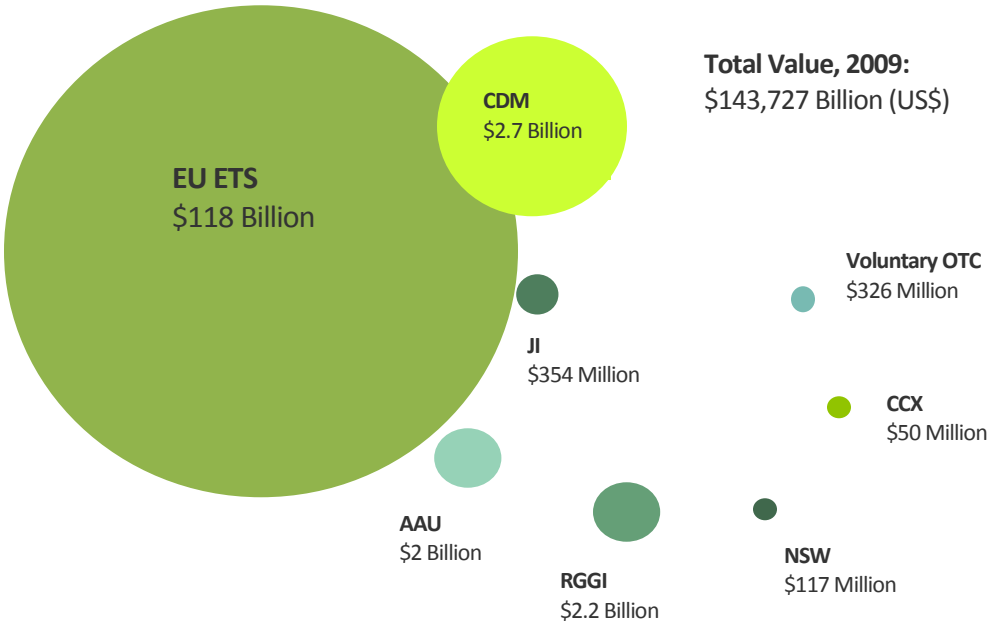
The voluntary carbon market category is an over-the-counter (OTC) marketplace. Over the past several years, offsets were also developed under the Chicago Climate Exchange (CCX) markets, which closed its operations in late 2010.

The compliance category includes the New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS), as well as the Kyoto Protocol-driven Clean Development Mechanism (CDM), Joint Implementation (JI), New Zealand Emissions Trading Scheme (NZ ETS), and Assigned Amount Units (AAUs), or Kyoto units.

Looking across markets and standards, it is essential to note that transacted assets vary considerably. For example, a temporary Certified Emission Reduction (tCER) under the CDM may be a different asset than a Voluntary Carbon Unit (VCU) under the VCS. However, all these assets are generally measured in tons of carbon dioxide equivalent (tCO_2).

Measured by volume, carbon markets are the largest type of environmental market in the world. In 2009, the value of global carbon markets reached almost US$144 billion, up from US$135 billion in 2008 and US$63 billion in 2006. At present, forest carbon projects are transacted in both voluntary and regulatory markets, as listed in Box 1 and illustrated in Figure 1.

Figure 1: The Universe of Carbon Markets in 2009



Source: Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T. 2010. *Building Bridges: State of the Voluntary Carbon Markets 2010.* Washington, DC: Forest Trends, Ecosystem Marketplace. (http://forest-trends.org/publication_details.php?publicationID=2433*);* Kossoy, A., and Ambrosi, P. 2010. *State and Trends of the Carbon Market 2010.* Washington, DC: World Bank. (http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_of_the_Carbon_Market_2010_low_res.pdf).

Types of Forest Carbon Projects

There are several types of forest carbon projects, all of which are sub-sets of terrestrial carbon projects. They include:

- Afforestation projects grow forests on land that has not been forested in recent history.
- Reforestation projects re-grow forests in areas where forests have been previously.

  Afforestation and reforestation (A/R) projects are commonly considered simultaneously, as both refer to projects where trees are grown.
- Improved forest management (IFM) projects include activities that will enhance carbon stocks on currently forested lands.
- REDD projects avoid GHG emissions by preserving existing forests threatened by activities that reduce the carbon storage of the forest.

It is noteworthy that, as the REDD domain has evolved, additional terms and meanings have emerged, including REDD+ and REDD++. The United Nations REDD Program explains that "REDD+ goes beyond deforestation and forest degradation and includes the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks." REDD++ refers to a broader suite of all land uses including afforestation, agriculture, and peat land management.

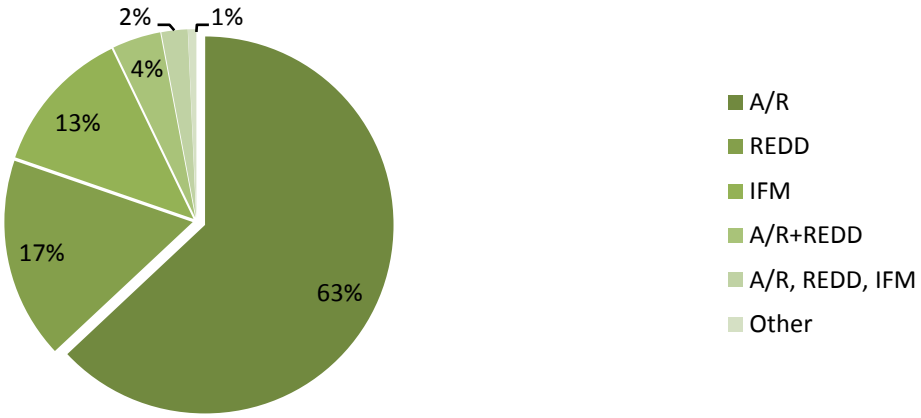
In addition, terrestrial carbon also includes soil carbon, which is intertwined with agricultural practices, grazing practices, and other land-management decisions.

Given this range of forest carbon project types, it is not surprising that the size of projects varies greatly. Some projects cover areas as small as a quarter hectare (these smaller projects are typically aggregated in order to minimize transaction costs), while others total several hundred thousand hectares. Forest carbon sellers range from subsistence farmers operating in remote parts of Latin America, Africa and Asia, to private timber companies in Canada and the United States, and, in some areas, government land management authorities. A project may constitute of anywhere from a few projects to a portfolio of many projects that span several continents.

Forest Carbon Transactions

Most forest carbon credits transacted were historically sourced from A/R projects (63%), followed by REDD projects at 17% and IFM projects at 13%. In 2008, A/R remained the top source for credits (53%). Projects with a combination of REDD, A/R, and IFM moved to second place, accounting for 24% of the volume, followed by IFM-only (20%). In the voluntary markets, the majority (60%) of A/R or IFM projects reported planting indigenous trees.

Figure 2: Historical Transaction Volume by Project Type



Source: Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T. 2010. *Building Bridges: State of the Voluntary Carbon Markets 2010.* Washington, DC: Forest Trends, Ecosystem Marketplace. *(*http://forest-trends.org/publication_details.php?publicationID=2433*).*

Within regulatory markets, there are few agriculture, forestry, and other land-use (AFOLU) carbon projects, relative to other types of carbon mitigation projects transacted. This imbalance is due to regulatory limitations. Specifically, the Kyoto Protocol limits eligible clean CDM project classes in the land-use area to afforestation and reforestation, excluding agricultural or forest management, avoided deforestation or degradation, and soil carbon management in developing countries. Further hampering growth of these project types is the fact that the CDM awards to A/R activities only temporary carbon credits that have limited fungibility with other traded carbon credits. The European Union emissions trading system (EU ETS) has excluded all terrestrial carbon credits.

Overall, therefore, terrestrial carbon—including forest carbon—is still emergent relative to other carbon transactions. To a large extent, this is a result of how regulatory markets were crafted and how challenging it has been to get AFOLU projects approved within the current rules. For example, although the CDM currently

recognizes nine different A/R methodologies and five agriculture methodologies,[8] these methodologies have been applied within only 56 A/R projects and one agriculture project—out of the total 5,365 projects in progress to date.[9] Given this unwelcoming context within regulatory markets, the majority of the activity particularly associated with AFOLU has been within the voluntary markets, which is quantified for 2008 and 2009 in Table 1.

Table 1: Land-Based Credits Sold in the Over-the-Counter Voluntary Carbon Market (2008 vs. 2009)

Project Type	Volumes of Land-Based Credits ($ktCO_2e$)		Market Share of Land-Based Credits Relative to the Total	
	2008	2009	2008	2009
A/R	4,091	4,253	8%	10%
Avoided Deforestation (REDD)	730	2,846	1%	7%
Forest Management	431	1,349	1%	3%
Agricultural Soil	267	1,250	0.5%	3%
Agro-Forestry	--	625	--	1%
Other Land-based projects	130	109	0.3%	0.3%
Total	5,650[10]	10,432	11%	24%

Source: Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T. 2010. *Building Bridges: State of the Voluntary Carbon Markets 2010.* Washington, DC: Forest Trends, Ecosystem Marketplace.. *(*http://forest-trends.org/publication_details.php?publicationID=2433*).*

The Ecosystem Marketplace report *State of the Forest Carbon Markets* 2009 noted a total volume of 20.8 $MtCO_2$ transacted in the global forest carbon market from 226 projects.

Forest carbon markets have grown slowly, as transaction volumes remained relatively low until 2006. In 2007, the volume transacted rose sharply, by 228%, to reach 5.1 $MtCO_2$. The year 2008 saw just a slight increase over 2007 levels, up to 5.3 $MtCO_2$. This growth trend continued in 2009, with project developers reporting 3.7 $MtCO_2$ already transacted in the first two quarters of the year. By the end of 2009, at least 9.1 $MtCO_2$ had been transacted from forest projects, a more than 70% increase over 2008 transaction volumes.[11]

Historically, most forest carbon deals (73% or 15 $MtCO_2$) have occurred in the OTC voluntary carbon markets, as laid out in Figure 2. About 12.5% of transactions (2.6 $MtCO_2$) have been transacted through the CCX, the NSW GGAS followed close behind with 8.7% (1.8 $MtCO_2$) of transactions. Combined, all of the Kyoto Protocol-driven markets transacted 1.3 $MtCO_2$ (6.25%), while CDM sales represented only a total of roughly half a million tons, or 4% of the global forest carbon markets.

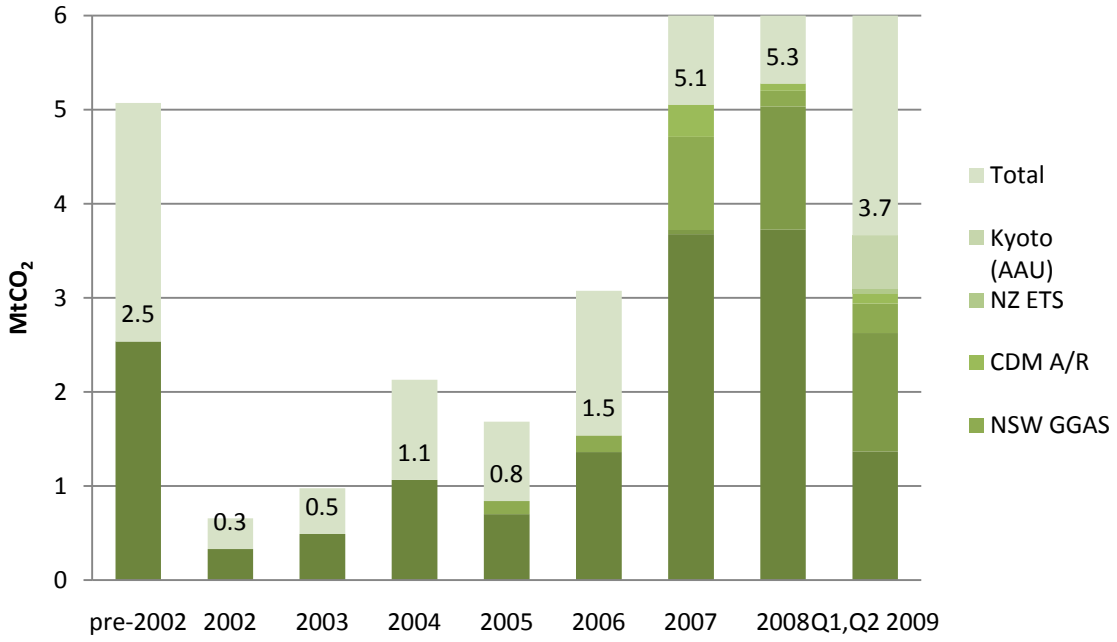
[8] For more information please see: http://cdm.unfccc.int/methodologies/

[9] http://www.cdmpipeline.org/cdm-projects-type.htm

[10] Total numbers for terrestrial credits are higher than 2008 volumes listed in the Ecosystem Marketplace's *State of the Forest Carbon Market* report because the addition of agricultural soil and other land-based project categories.

[11] For further details, please see Hamilton, K., Chokkalingam, U., and M. Bendana. 2009. *State of the Forest Carbon Markets 2009: Taking Root and Branching out*. Washington, DC: Forest Trends, Ecosystem Marketplace (http://forest-trends.org/publication_details.php?publicationID=2384).

Figure 3: Historical Transaction Volume in Forest Carbon Markets



Source: Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T. 2010. *Building Bridges: State of the Voluntary Carbon Markets 2010.* Washington, DC: Forest Trends, Ecosystem Marketplace. *(*http://forest-trends.org/publication_details.php?publicationID=2433*).*

Buyers in the Forest Carbon Market

Historically, the majority of demand for forestry credits has been from voluntary buyers who purchase credits to offset their own emissions and retire their credits immediately upon purchase. These voluntary buyers choose forestry offsets projects for a suite of reasons, including that certain projects:

- Are easier to communicate than other types of offsets, as well as visually compelling through images of forested ecosystems, thereby potentially yielding brand-enhancement benefits;
- Equate to tangible land-use change, which similarly has clear communication benefits; and
- May be bundled with social and environmental co-benefits that appeal to multiple concerns, from environmental conservation to poverty alleviation and social justice.

Not surprisingly then, a survey[12] that asked 141 corporate buyers of forestry offsets about their attitudes toward forest carbon found that the top reasons for choosing forestry credits were:

- Community and environmental benefits generated from forestry projects;
- The scale of the deforestation and climate change problem; and
- The tangibility of offsets with carbon stored in the biomass of trees.

Yet, while forestry is a top choice for some buyers seeking to offset emissions, forestry offsets have continued to lose market share in the voluntary OTC market since 2004.[13] Only recently has the overall slowdown of the

[12] This survey was conducted by EcoSecurities, the Climate Community & Biodiversity Alliance (CCBA) and Greenbiz. For more information please see: http://www.ecosecurities.com/GetAsset.ashx?AssetId=24136

voluntary markets allowed forest carbon to regain market share. Generally, the same issues that kept forestry and other land-based projects from playing a major role in the Kyoto markets—additionality, leakage, permanence, investment risks, and accounting questions—have also hampered the growth of these projects in the voluntary carbon markets.

Box 2: Illustrative Steps in Forest Carbon Project Development

Step 1: Identify prospective project sites, which entails identifying forest carbon project opportunities and gathering information on direct project benefits (such as carbon sequestration, financial costs/returns, and land productivity) as well as indirect benefits (or co-benefits) associated with biodiversity, improved livelihoods, and other factors.

Step 2: Conduct detailed assessment of both financial and legal questions, such as land and carbon rights ownership, socio-economic impacts, and current carbon sequestration rates (the project baseline), in order to accurately assess measuring, reporting, and verifying activities in the future.

Step 3: Design forest carbon project, which is comprised of documenting a range of factors, including:

- Project site and land ownership (through formal legal titles and assessments of who is using the land),
- Current carbon stocks and baselines,
- Alternative land management practices needed to sequester carbon (and livelihoods),
- Socio-economic impacts of changing current land management practices and feasibility of adoption rates being maintained over time,
- Implementation/management and monitoring plans, and
- Support/infrastructure (such as nurseries, if planting trees)

It is noteworthy that REDD projects include other elements as well, such as detailed deforestation assessments.

Step 4: Forge formal agreements which delineate monitoring timeframes as well as external verification and validation, if these elements are part of the agreement. All paperwork must be filed with the appropriate authority related to any covenants placed on the land around carbon, registration of carbon, international carbon sales that may have tax implications, and other such details.

Step 5: Implement, monitor, verify & validate, which are a series of tasks that commonly occur over many years, as agreed by the forest carbon seller and buyer.

[13] Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T. 2010. *Building Bridges: State of the Voluntary Carbon Markets 2010.* Washington, DC: Forest Trends, Ecosystem Marketplace. *(*http://forest-trends.org/publication_details.php?publicationID=2433*).*

Sellers in the Forest Carbon Market

Depending on their position in the supply chain, sellers can be categorized into four major types:

(1) *Project developers* who identify and develop GHG emission reduction projects and who may sell the credits to aggregators, retailers, or final customers. (Please see box for details on forest carbon project development.)

(2) *Wholesalers* who serve as intermediaries selling offsets in bulk and who have ownership of a portfolio of credits.

(3) *Retailers* who act as intermediaries that sell small amounts of credits to individuals or organizations, usually online, and who have ownership of a portfolio of credits.

(4) *Brokers* who do not own credits, but facilitate transactions between sellers and buyers.

Over time, non-profit developers have supplied 53% (7.0 $MtCO_2$) of the total volume of forest carbon offsets, followed by private sector developers (40% or 5.3 $MtCO_2$) and then public sector developers (7% or 0.9 $MtCO_2$). The significant role of non-profit organizations is partially due to their early role in market development as well as their ability to access development funds from philanthropic donors. Before 2002, the non-profit sector transacted three-quarters of the credits on the market. Between 2002 and 2007, the non-profit sector still dominated the market but the for-profit sector increased its market share. In 2008, for-profit companies reported transacting 553,658 tCO_2, non-profits 1.4 $MtCO_2$ and governments 860,800 tCO_2.

Market value shares are spread relatively evenly for the non-profit and private sectors. The private sector made up nearly half the market value at $54.5 million while non-profit sector sales equated to $49.2 million. Public sector trades were worth $8.1 million. However, the non-profit sector's figures were of lower value due to a lower volume-weighted price average, despite this sector's capturing the lion's share of the market.

There are a range of value-chain patterns in the OTC market. At the most simple level, a final buyer purchases credits and retires them from a project developer. In more complicated instances, an offset credit will pass in a brokered deal between a project developer and an aggregator, and will then be sold to a retailer who sells it to the final buyer, as illustrated in Figure 4.

Figure 4: Illustrative Forest Carbon Project 'Supply Chains'

Project Development Costs & Timing

Not surprisingly, the costs of developing forest carbon projects vary greatly. Costs can include staff time to reach out to prospective landowners—who may be sellers of carbon, such as farmers—through engaging remote-sensing specialists to assess historical land cover or international experts to verify and develop project opportunities.

There are a wide range of factors that affect project development costs, including:

- The number of landowners involved,
- The status and clarity of land ownership,
- The status and clarity of local carbon rights laws,
- Carbon sellers' familiarity with carbon agreements and the relative effort required to ensure prior informed consent, and
- Buyer demand for projects that follow particular offset standards, including third-party verification.

Costs are higher for projects that seek formal validation and verification according to standards, be it for regulatory markets or for common voluntary standards, such as the VCS, CCB Standards, and the Climate Action Reserve (CAR or the Reserve).[14]

Overall, forest carbon project development and preparation of the project design document (PDD) can easily cost $100,000 or more, depending on project characteristics such as technical complexity of the project and required technical expertise, land tenure patterns, local governance institutions, and a range of other ecological and institutional issues that must be navigated in putting together a project.

[14] Interviewees most commonly stated use of VCS and many added on the CCB, while others also use CAR. One interviewee stated they were using the Ramsar wetlands approach. Of course, internal standards for specific project developers also exist, both proprietary standards for private firms as well as open standards, such as Plan Vivo and the FACE Foundation.

Implementation costs also vary significantly by scale. Project size can affect required staff time, project materials, consultants (ranging from legal advisors through third-party verifiers), and other transaction costs. While there is hope that the overall forest carbon project costs will decline in the future—as experience is gained and efficiencies are developed—the prospects for cost efficiencies remain unclear.

The challenge for forest carbon project developers and sellers is that many project costs are borne early in the development process, usually before carbon sales. Therefore, most projects experience a financing gap, which includes costs associated with project design and start-up—such as establishing a nursery for seedlings—as well as the transaction costs, such as legal costs and other costs associated with closing the deal.

The resulting need to secure start-up funding for forest carbon projects is a fundamental bottleneck to increasing the number of projects. Currently, this financing gap is being bridged either by philanthropic sources, often funneled through non-governmental organizations (NGOs), or by investors with some appetite for risk.

While the amount of public financing for project development has recently increased, particularly with commitments for REDD, the reality is that these funds will improve conditions for forest carbon opportunities only in those countries where there appears to be greatest interest. That is, funds will be invested in building capacity for creating supportive legal frameworks as well as measuring, monitoring, and reporting on carbon projects. Such public funding is therefore targeting "readiness", whereas private money will be an essential component for sustaining REDD projects and programs.

Prices

For projects that have been successfully financed and brought to market, prices for forest carbon credits have ranged from $\$0.65/tCO_2$ to more than $\$50/tCO_2$. There are several reasons for these substantial price variations. Since the first forest carbon projects were commercialized in the 1990s, the accounting practices, standardization, and number of projects being launched have matured and grown considerably. Over the past 5-10 years, the increasing use of standards has helped an evolution towards roughly equivalent procedures for calculating credit volumes from projects. The more recent rise of registries and exchanges is also helping to establish more transparent price signals across the marketplace for interested buyers. Nevertheless, largely due to their voluntary nature, forest carbon transactions still tend to be very personalized in nature. Most transactions still occur "over-the-counter," where buyers and sellers reach a private agreement about pricing which can vary significantly from deal to deal and may be informed more by the value perceptions and goals of the buyer than by a market-wide price signal. Based on forest carbon transactions as far back as 1990, Ecosystem Marketplace has observed a volume-weighted average price for forest carbon credits over time of $\$7.88/tCO_2$.

The compliance markets—such as the NSW GGAS, CDM, and NZ ETS—have commanded the highest prices, with a volume-weighted price average of $\$10.24/tCO_2$, followed by the voluntary OTC market at $\$8.44/tCO_2$. Average prices for tCERs, which must be replaced or reissued at the end of their crediting period, were significantly lower at an average of $\$4.76/tCO_2$. The least expensive credits were traded in the CCX at an average of $\$3.03/tCO_2$.

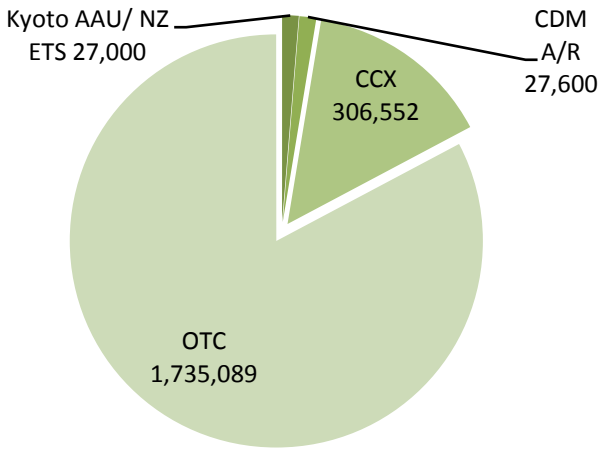
In sum, the total historical market value tracked by the *State of the Forest Carbon Markets 2009* report through the first half of 2009 was $149.2 million, of which $137.6 million arose from the voluntary markets and $11.6 million from the compliance markets. In the voluntary market in 2008, CCX accounted for 26% of the voluntary market in transaction volume but only for 14.4% in value, indicating the far lower prices ($\$1.96\text{-}4.06/tCO_2$)

available for CCX forestry credits. The Kyoto AAU credits arising from the NZ ETS in the first half of 2009 captured the bulk of the regulated market value, with a relatively high minimum price of roughly €10/tCO_2 ($14.05). Average prices for tCERs, which must be replaced or reissued at the end of their crediting period, were significantly lower at $4.76/$tCO_2$.

Land Covered & Geographic Range

Project developers reported a total area of 2.1 million hectares as influenced by forest carbon sequestration or avoided emission activities. In reality this number is likely to be much higher. OTC projects covered 1.7 million hectares (83% of the total area), CCX projects covered 306,552 hectares (14.6% of total area) and compliance market projects covered a mere 54,600 hectares (2.6% of total area).

Figure 5: Area Influenced by Projects (Hectares)



Source: Hamilton, K., Chokkalingam, U., and M. Bendana. 2009. *State of the Forest Carbon Markets 2009: Taking Root and Branching out*. Washington, DC: Forest Trends, Ecosystem Marketplace. (http://forest-trends.org/publication_details.php?publicationID=2384).

North America (7.2 $MtCO_2$) and Latin America (3.9 $MtCO_2$) topped the list of places where the most transacted credits originated, accounting for 40% and 22%, respectively. Oceania, which mainly consisted of projects in Australia, followed with 16% of the volume transacted. Africa was the source of 11% of transactions, with Asia and Europe making up 6% and 4%, respectively. When the total value for each region is considered, the ranking across markets is as follows:

- $37.8 million for Oceania
- $35.5 million for Latin America
- $32 million for North America
- $20.9 million for Africa
- $9.9 million for Asia
- $6 million for Europe

Although Oceania was the third-largest region by volume of credits sold, it was the top region when total value was considered.

Standards

Over the past 20 years, forest carbon markets have evolved and the methodologies, measurement, and market infrastructure have become increasingly sophisticated. Standards are increasingly utilized for establishing quality benchmarks and consistency.

The OTC forest carbon offsets market exhibits an increasing use of standards, particularly those that emphasize the co-benefits of forest carbon projects and third-party verification. Specifically, 86% of all OTC forest carbon offsets have originated from projects involving an internal or third-party standard. Certification to third-party standards increased significantly from a mere 15% of offsets in 2002 to a significant 96% in the first half of 2009, and account for 70% of all OTC offsets transacted over time.

Standards broadly fall into two categories:

- Standards that focus on the quality of measuring and monitoring carbon, and
- Standards that focus on qualities beyond carbon ("co-benefits").

Across markets, 23% of all offsets coming from projects validated to a third-party standard were reported as complying with the CCB Standards. This amounts to 3.7 $MtCO_2$ of GHG reductions. The prevalence of CCB Standards offsets points to a historic demand for forestry offsets with environmental and social co-benefits, but does not necessarily correlate with verified GHG-emission reductions or issued credits. CCB Standards-certified projects may or may not also comply with an additional standard more formally associated with carbon content. Another 16% of the offsets were listed on the CCX and conformed to the CCX standards.

All 2010 interviewees who mentioned standards said that they were seeking most commonly VCS (often with the CCB Standards), and when operating in California, their focus was on CAR. Both these standards are detailed in Annex 2 along with other key standards.

Lessons

Given the range of forest carbon project standards, implementation, strategies and contexts in which forest carbon projects have been developed, it is not surprising that a rich and varied set of lessons has been accumulated over the past two decades. According to stakeholders, the primary lessons include:

Lesson 1: Do your best to play by the rules, even when they are unclear.

Forest carbon is still an emerging field. Not surprisingly, the top set of issues cited by forest carbon leaders relate to the challenges of operating within an emerging market in which there has been a lack of rules, yet a concurrent expectation among buyers is that transactions are based on sound scientific, legal, and investment bases. Clarity in the following areas would generate confidence for both investors and developers:

a.) Methodologies – Credible, scientifically-based, peer-reviewed guidance on how to develop forest carbon projects

The first area in which guidance is emerging relates to the core 'how-to' elements of forest carbon. In the early years of forest carbon, the lack of credible, peer-reviewed methodologies has been a fundamental stumbling block for many early project developers seeking to show scientific rigor without being crippled by costs associated with carbon measurement and management planning. Considerable work has gone into methodology development, however, and more methodologies are now in development and in peer review processes. Market watchers assert that a sufficient number of relevant methodologies will exist in ten years, or even sooner.

b.) Legal Issues - Clarity on legal issues surrounding project development and transactions

The most fundamental legal issue with which project developers have had to grapple is whether or not carbon can be transacted and, if so, who owns it—the landowner, the government, or another entity.[15] The fact that this question of carbon ownership is raised in every country where forest carbon transactions first start adds another layer to prospective project site assessments and, of course, preliminary costs.

Box 3: Legal Questions in Exploring Potential Projects

- Who owns the land?
- Is the owner managing the land or someone else (who may not be interested in a carbon project)?
- Who owns the carbon rights? Who (else) has claim on the land (or carbon)?
- How do we understand (and address) these claims?
- What are the legal documents that we need to secure this sale within a particular country's national laws?
- How do the project's legal documents relate to other laws and policies of the country?
- What are the tax implications and related financial liabilities associated with carbon sales?
- Will emission reductions be eligible under future compliance regimes?

[15] In Brazil, for example, Forest Trends commissioned a law firm to assess who had carbon rights on the indigenous Surui lands. For details, please see: http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7382&section=home and http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7611&section=home

Clarity on what the national rules are that govern carbon transactions

As with many commercial endeavors, government sanction for forest carbon projects is critically important from national to local levels as governments set the legal and policy context for these projects—from land ownership, to carbon rights rules, contract laws, and tax rules for the export of offsets.

The challenges encountered to date have been numerous. For example, one project developer described a situation in which it was unclear which government agencies and officials had authority to discuss and determine carbon issues. Several project developers described lengthy carbon rights negotiations with government officials that ended as government officials refused to assert anything other than government rights.

Adding further complexity to project assessment and government sanction is the reality that few government officials are familiar with the intricacies of carbon markets. International policy remains fluid and, consequently, many national governments have yet to develop and mobilize specialized civil service personnel. As a result, many governments do not have the resources—human, technical, or financial—to craft carbon rights policies or enact other enabling policies associated with forest carbon. The recent pledging of public funds for 'REDD readiness' may change this context in certain parts of the world, although the learning curve remains steep. Considering the fundamental nature of these 'readiness' policies, national policymakers should be supported in making the necessary investments to understand the intricacies associated with terrestrial carbon prior to issuing definitive policies. While these investments are beginning to be made—primarily by bilateral funders—significant work remains, particularly in developing countries where governments are already resource-constrained.

One project developer illustrated the complex government and policy landscape by describing a situation in which the national government's future policy on sharing of project revenues was unclear. Initial discussions focused on a flat tax on the project. However, before final agreement was reached, the national position shifted to define carbon as a national asset that could *not* be appropriated by international players. While this policy change is fully within the right of a national government, it is an example of the challenging and uncertain context forest carbon project developers and investors are facing.

This example underscores the importance of a stable policy climate to attract forest carbon investments. Thus, concurrent with exploring potential carbon policy, governments around the world may also wish to institute mechanisms that ensure transparency on how carbon funds are earned, transferred, shared, and utilized. For example, if a nation could have a clear policy around revenue-sharing—50% of revenues to schools, 25% to hospitals, and 25% to government, for example—then it may receive more in-country support for carbon transactions. Alternatively, the benefit-sharing breakdown could be more complex, such as: 15% of revenue to the government for establishing registry; 50% to communities for projects of their own choosing; 25% to the project manager; 2.5% to a national foundation to manage funds; 2.5% to verifier, and 5% to a project-specific carbon company that sells the emission reductions credits.

The key is that clarity, stability, and enforceability of legal issues are fundamental components of investor and project developer confidence in potential forest carbon projects and host countries.

Clarity on legal language and filing requirements for carbon transactions

Project developers reported spending considerable time on the development of legal agreements to transact forest carbon. Even after agreements are reached, legal questions persist. For example, in the United States, purchase agreements are not always recorded and associated with the land title. Although purchase

agreements should be recorded with the county courthouse and appended to the deed, developers reported that this procedure is not always followed which has led to ongoing legal challenges and costs associated with carbon sales.

Such questions and administrative challenges can lead to ongoing legal consultations and delays, ultimately increasing project costs. Yet, if forest carbon project developers seek to draw upon multiple funding streams to address cost overruns, such as government conservation incentive programs, questions may arise around whether such outside support renders activities no longer 'additional' to business as usual. This conundrum is one of many in the tangle of emerging legal and definitional questions.

c.) Regulatory Futures - Clarity on the future inclusion of forest carbon in regulatory schemes would help investors assess opportunities to invest in projects

As the future of regulatory carbon markets, and specifically forest carbon, is uncertain, it is challenging for investors to forecast potential future demand. As a result, many investors have engaged in this market only at very small scales. Further inclusion of forest carbon in regulatory schemes would obviously translate into a significant increase in demand, thereby justifying far more investment. The longer the uncertainty remains, the more likely it becomes that most investors will wait to see how market size develops in the future.

Overall, these methodological, legal, and regulatory issues are not surprising, since forest carbon is still in many ways emerging as a market and an investment class. The challenge for investors and project developers has been to play by the rules when the rules are still being written in many ways. As forest carbon markets mature, and particularly, if they become part of a regulatory scheme, then many of these issues will be addressed. Today, however, the challenges persist and care is needed in assessing all legal issues, crafting agreements, and estimating costs.

Lesson 2: Become comfortable with complexity.

Forest carbon projects can be relatively straightforward or extremely complex. Projects may simply involve planting trees on a single parcel, or may require brokering a REDD project across multiple land ownerships and jurisdictions. (For illustrative steps in developing a REDD project, please see Box 4). For more complex forest carbon projects, it is not surprising that successful development requires navigating a number of challenges:

a.) Effectively engaging landowners and/or community associations

Outreach to prospective forest carbon project sellers—landowners and/or community associations—is time-intensive and can be challenging given the geographic spread of landowners, local expectations, and local customs and protocols. If the potential project site is large, prospective sellers can be spread across a landscape, and the process of visiting people can take a significant amount of time. Meeting expectations of building relationships prior to initiating business discussions can be essential, but also adds to time and cost requirements.

For example, one project developer had to visit 40 distinct communities in order to discuss the project with all landowners and to secure agreements. The process began in 2006, and four years later, in 2010, outreach was still continuing, now with a focus on climate-friendly land management training and engagement with emergent community associations.

To effectively manage community engagement, many forest carbon project developers select local NGO partners. This selection must be done in a rigorous process to ensure that the NGO is in good standing with key stakeholders. Assessing the strength of prospective on-the-ground partners often occurs through a combination of an in-depth structured assessment and due diligence process, as well as time spent at the prospective project site discussing proposed actions, incentives, issues, and other details associated with the project.

Given these complexities, successful development depends heavily on extensive local knowledge. Not surprisingly, many project developers stated that leads on new projects and advancing current projects are primarily driven by personal relationships. These relationships are typically identified by senior forest carbon project developers, as well as their network of advisors.

b.) Effectively managing gaps between on-paper legal ownership and on-the-ground land management, either at the project outset or during the course of implementation

In many parts of the world, gaps exist between *de jure* (codified law) and *de facto* practice. For example, ownership of lands may legally reside with one party, but in reality other people may inhabit the land and rely on it in order to feed their family. Such gaps are often a result of poverty and land fragmentation.

Challenges emerge when natural resource uses shift during the course of a forest carbon project or when a prospective forest carbon project developer decides to move forward in an area with conflicting claims, for example, if a carbon project is located on public lands, which are later subject to encroachment by desperate subsistence farmers. The situation is understandable in that families are focused on securing their food and livelihoods, but at the same time it is challenging and complex from a forest carbon project management point of view.

When there are pre-existing claims or new claims that emerge during a project, it is judicious to establish extensive consultation processes and multi-stakeholder steering committees to guide forest carbon projects and ensure that they can meet carbon metrics while remaining supported by key on-the-ground players. For example, one project developer described a 19-person steering committee that had to be established due to a complex tenure and natural resource use context. The committee considers every development decision, however large or small. The process of developing the project has subsequently slowed considerably, but this stakeholder consultation process appears to be the only governance structure that will yield a durable project.

c.) Effectively understanding and navigating local politics and land-use incentives that affect project establishment and viability over time

Understanding and obeying local governance, jurisdictions, policies, and protocols (both formal and informal) is an essential aspect of successful forest carbon development and natural resource management more broadly.

On one project, revenue-sharing and governance issues with the local community were controlled by the local government, but local authorities were not in good standing with the local population, as they had failed to call elections and regain a mandate from community members. The project was stymied by the need to work with a local government whose authority community members did not recognize.

On another project, local officials charged with protecting the project site against encroachment were actively recruiting new farmers to settle on the lands in exchange for an illegal fee. The project developer faced the challenging situation of having to address corruption issues at multiple levels.

While these types of governance issues exist in all or most countries, for forest carbon projects, as well as other large investment projects, this means that governance and transparency are additional elements on which to conduct due diligence, and which need to be tracked and managed during project implementation. Clarity regarding governance issues is likely to increase as the forest carbon marketplace matures, particularly if forest carbon is integrated into future regulatory markets. As investors look forward, inclusion in regulatory markets should help determine the appropriate level of engagement and is a potential element for which to advocate among regulators.

Similarly, local policies, programs, financial incentives, and local culture can all shape land-use decisions and thus affect project viability. Since subsidies or tax incentives promoting other land uses can render carbon payments insufficient to encourage forest protection and since carbon payments alone are seldom sufficient to drive forest carbon projects and create incentives for particular forest management activities, it is essential for investors to understand local incentive systems that include both formal policies as well as informal pressures, which will vary significantly by location.

d.) Effectively identifying and, if needed, gathering ecological data for forest carbon project baselines

Forest carbon projects are fundamentally about the establishment of an emissions baseline and demonstrating a change over time. Debates around issues such as permanence, additionality, and leakage have created uncertainty and led to complex validation and monitoring requirements. Carbon experts are required to conduct project assessments, which can be costly and complex, especially when international experts are consulted.

The problem in many locations is an inadequate understanding of the particular forest ecosystem. For example, one project developer faced the challenge of designing a large-scale tree-planting initiative without pre-existing growth and carbon sequestration data in the country. The developer had to collect data to determine this information at their own cost as a pre-requisite to developing the project. As a project expense, the developer launched a research project in collaboration with two universities and conducted additional work on pest control and forest management. Despite these efforts, identifying the parameters to estimate tree growth rates remains a challenge at this project site to this date.

With the increasing development of REDD projects, developers must identify clear threats of deforestation, develop a plan to address these threats using reliable data, prove financial viability, generate social and biodiversity co-benefits, and explore key issues around nesting of individual projects within national accounting schemes (which are still emerging in some parts of the world). A project developer's overarching goal to establish a sustainable and high quality REDD project can be broken down into a series of tasks, as illustrated in Box 4.

Box 4: Example of Forest Carbon Project Complexities: Illustrative Tasks Associated with Developing REDD Projects

- Project developers must address complex issues at every stage of developing a forest carbon project. A developer for a REDD project, for example, faces the following tasks:
- Understanding rates and drivers of deforestation, which are difficult to assess, especially as there is often a lack of on-the-ground data. Landscapes can be undergoing rapid changes from urbanization, shifting agricultural frontiers, and many other dynamics, which adds complexity to modeling deforestation today and where it may occur in the future.
- Creating a plan to address drivers of deforestation, document additionality, and mitigate against leakage, which must be conducted with a degree of precision and standardization that runs counter to the way that many resource users and farmers manage their systems. Furthermore, progress must be monitored over the long-term, sometimes through multi-decade agreements.
- Quantifying carbon storage and emissions associated with business-as-usual and with-project scenarios which is often hampered by a lack of ground-truthed data.
- Assessing project feasibility, based on estimated carbon revenue, total costs, and modeling ecological processes as well as financial viability for project components, particularly those reliant upon alternative livelihoods, such as ecotourism and eco-enterprise, as well as those dependent upon timber pricing, which is likely to change over the course of the agreement.
- Ensuring that landholders have secure land tenure and when operating with indigenous and local people, also ensuring that there are transparent and fair consultations so that benefit-sharing is approved and institutions are in place to meet and enforce expectations.
- Matching community land-use objectives with carbon outcomes, for example, a farmer's focus on agricultural yields may benefit from carbon technical assistance that identifies land-management practices—such as utilizing compost as a fertilizer—that could have measurable soil carbon benefits as well as agricultural yield benefits.
- Identifying suitable buyers and transaction terms, as some sellers have had an aversion to selling to particular companies or having to pay broker fees.
- Establishing legal parameters for project implementation; as the legal and policy context continues to evolve in many countries, creating additional uncertainty, project developers must identify and manage the risks associated with potential changes to government regulations and policies.
- Identifying and partnering with strong implementers who will ideally have technical forestry capacity as well as experience with complex project administration and community engagement.
- Managing seller's expectations of deal terms, as sellers may expect higher revenues than market prices may allow.
- Ensuring that funds can be distributed in an efficacious way, to incentivize those whose work actually makes the project effective and sustainable, which is essential as appropriate flows of money are necessary in order to create the incentives that address (and avoid) deforestation.

Lesson 3: Plan ahead for early stage financing and access to technical expertise access.

Due to the diversity of biological systems and the need to respond to critics of terrestrial carbon transactions, the development of forest carbon projects requires significant technical expertise. Regarding the former, numerous technical issues arise in the assessment, design, monitoring, and verification of forest carbon projects. An in-depth analysis is required to obtain a baseline forest inventory and to understand which land-management practices will lead to strong carbon yields. As to the latter, responding to program criticism requires the identification of specific land management practices, estimations of carbon yields, and the development of credible and cost-effective monitoring, verification, and validation plans.

Globally, the pool of qualified experts offering consulting services remains relatively small, with some regions experiencing particularly acute shortages in available experts for a timely and cost-effective fashion so that forest carbon projects can continue to emerge. The reasons for the current small number of experts are that forest carbon is a relatively young field, and the pool of people with the requisite technical skills and field-level experience is limited. Also, market demand has not yet warranted hiring and training of many new carbon technicians. This circumstance is not uncommon in early market development; the development of certification, such as for timber and coffee, can provide good models for addressing this obstacle.

Even when experts are brought to a project, assessment can still be very difficult. Technical skills are needed not just for project design, but also for continued forest management to manage tree planting, insect infestations, disease, site mapping, and data-tracking, among other items. One developer described a case in which there were no forestry contractors available and no local knowledge of how to manage a reforestation program, and international experts were needed to train and work with local counterparts. The project developer hosted a formal education course that provided housing and training, and ultimately jobs for successful graduates. The project developer stated that the return on this investment has been positive and has yielded several important local staff members. However, it has necessitated a commitment to the country for many years. While such a longer-term commitment applies to many carbon projects, the distinction is that carbon finance is expected to be the primary source of project finance. In this case, in which training was needed for local staff members, carbon finance was inadequate, particularly in the early years of the projects. In light of these technical and cost demands, the growth of forest carbon projects is likely to depend on more traditional finance to help underwrite costs.

Lesson 4: Be conservative in all estimates—of carbon, benefits, time, and cost.

The durability of a forest carbon project relies on establishing realistic expectations among all players, from landowners, to government officials, investors, and buyers. Many aspects of project development are time- and cost-intensive. Many projects have had higher costs, required more time, and generated less carbon than originally anticipated. While experience will improve estimates, a conservative approach has proven most judicious.

The full forest carbon project cycle—from project design through credit generation—typically lasts 3-5 years. It can be prolonged, if there is insufficient funding and if methodologies are not approved. Neither of these circumstances is uncommon. For example, it took more than two years for the VCS to approve the first IFM

methodology and REDD methodologies developed by, and at cost to, a project developer. In an effort to address this bottleneck in approved methodologies and create new incentives for the development of forest carbon methodologies, the VCS is establishing a royalty system to pay back the expenses borne by project developers whose methodologies can now be applied by other projects.

Nevertheless, the pace of methodology approvals across all standards remains a significant factor slowing the process of project development and sales. While this issue will abate as forest carbon matures as an investment class, it remains a key factor for investors to consider in estimating costs and time needed in the process of new project development.

Finally, outreach to prospective sellers is also time-intensive, particularly with rural farmer groups or indigenous peoples, as it is essential to ensure that the process enables full prior informed consent before entering into forest carbon agreements.

Since the initial phases of forest carbon projects can be quite capital intensive, significant communication is required to establish lasting deals. Some project developers and investors have pulled back from providing continued financial support, as it became clear that projects would be unable to guarantee the desired returns of corporate investors within expected timeframes. The key is ongoing realism in all aspects of the project.

Tools for Avoiding Past Pitfalls

The last few decades of experience with forest carbon projects have delivered a range of experiences and practical tools that can make these projects more successful, including:

- Forest carbon project screening criteria, as laid out in Box 5/Table 2;
- Forest carbon project certification schemes;
- Rigorous monitoring; and
- Registries, as laid out in Annex 3.

All of these tools are elements of a working infrastructure that mitigates risks for market players. As the forest carbon market matures, so too will all of these risk mitigation tools.

At this point in time, many project developers and investors asserted that it is important to follow a strict project-screening process, which is a significant task. Industry leaders have begun to develop appropriate criteria for successful screening. Preliminary assessment criteria, synthesized from interviews, are presented in Box 5. More detailed criteria are offered in the annexes. These criteria will likely need to be adjusted for different types of forest carbon projects.

Table 2. Preliminary Project Screening Questions for Investors

Once a prospective forest carbon investor has assessed the preliminary financial models of early-stage projects, the investor needs to consider complex contextual issues that will determine a project's success or failure. A preliminary review could include the following questions:

Relevant International Standards and Methodologies	• Are there applicable international methodologies, in particular, for this proposed project? If not, which approach will be followed? Why?
Enabling National Context	• Are there national policies that are explicitly supportive of carbon transactions and that could be invoked in addressing legal issues (such as issues of land ownership, tax liabilities, grievance resolution, benefits-sharing, etc.)? • Are environmental services or the role of forests considered in the national constitution in a way that might guide future legislation to be less supportive of a forest carbon project?
Supportive Local Context	*For all projects:* • Do on-the-ground partners have the necessary institutional mechanisms and relationships with other key parties to oversee complex projects? For example, do they have a demonstrable history of community respect and robust engagement processes, financial management systems, record-keeping skills, and other elements needed for project management and implementation? • Is there clarity on how to ensure fairness as well as free, prior, informed consent within this context?

	If on private lands, indigenous lands, as well as lands with clear usufruct or long-term lease arrangements:
	• Is there a history of land title conflicts? High population density? Small parcels?
	  o If so, what assurances exist regarding land ownership and tenure for the parcel(s) on which the project will focus?
	• Are usufruct and/or long-term lease arrangements clear and enforceable? By whom? How? At what cost? What are threats to these rights over the life of the project?
	• Are there significant local food security and/or fuel wood issues?
	  o If so, what are the plans to ensure that they do not undercut the project?
	• Will the proposed forest carbon project compensate all natural resource users who are being requested to change current practices? If so, how and by how much? Are these figures meaningful in the local economic context?
	• Are there prospects for monetary benefits to land managers (and the local community, particularly for government lands) throughout the life of the project and are these benefits meaningful in terms of purchasing power?

	If on government-owned lands: • Is there a history of encroachment by subsistence farmers? Rapid migration into the area? Illegal logging? Local government corruption? o If so, what are the plans to ensure that these issues do not undercut the project?

Technical Context	• Does the necessary ecological data exist for the site (or similar sites from which such data can be credibly extrapolated)?
	• Is there a need for international forest carbon experts on methodological issues? Verification?
	  o If so, what is the timeline and cost of accessing these experts? Have delays in availability of international experts been factored into contingency plans?
	• Is there experience with the type of forest carbon project that you are planning in the area (e.g., tree planting)?
	  o If not, what is the plan for acquiring data and ensuring workers are skilled to use high-quality materials for the job (e.g., seedlings, etc.)?

Conclusion: Trends & Opportunities

Forest carbon has a twenty-year history of appealing to developers, investors, and buyers. Its appeal continues today. Despite ongoing lack of regulatory clarity and the associated nearly 30%-drop in the volume of voluntary carbon market sales, the number of forest carbon credits transacted nearly doubled from 2008 to 2009. Additionally, the pledging of public funds to REDD—including donor commitments of over $4 billion over the next three years—is likely to increase institutional capacity and establish mechanisms for forest carbon transactions in the countries receiving funds.

Looking forward, if there are no international regulations driving the process, it is likely that forest carbon projects will develop in areas with favorable ecological conditions and supportive national and local policies. Potentially promising locations mentioned in the interviews included: specific Brazilian states (such as Acre), Colombia, Costa Rica, Ghana, Indonesia, Kenya, Mexico, Peru, South Africa, as well as possibly Cambodia, Guatemala, Laos, Papua New Guinea, Thailand, Vietnam, and Uganda.

Box 6: The Future of Forest Carbon

- Certain parts of the world are likely to become more 'primed' for forest carbon projects in the coming years for a range of reasons most notably including in-country policy context.
- Countries interested in promoting forest carbon credits should create, or enable creation of, cross-cutting policy supports for carbon transactions.
- No significant expansion of forest carbon transactions is likely until climate regulations include forest carbon offsets.
- Near-term investment is likely to be focused on charismatic projects with multiple revenue opportunities and in nations with friendly economic and land-use policies.
- Development of national accounting programs and policies are essential to enable private forest carbon projects.

One key element of enabling national policy contexts will be government capacity to host forest carbon projects and establish frameworks for a national accounting program into which private projects can be placed. This approach is described as a "nested" approach, and is making progress in places such as Oaxaca, Mexico and Acre, Brazil. California has made agreements with these states for pilot projects to protect their rainforests in return for carbon credits under the provincial-level, international climate initiative. Such national accounting programs provide clarity on proper procedures and give investors a tool through which to assess national performance, thereby reducing both up-front costs and project expenditures on baseline determination and carbon stock estimates. An ideal national accounting program would include:

- National guidelines on sharing benefits with the government and local stakeholders;
- Legal clarity on land title, land-use rights, and emission reductions;
- National government-endorsed monitoring approaches and technical standards;
- National carbon transaction systems that enable offset sales and maintain a registry; and
- Clearly defined roles for private and public entities at national, sub-national, and project levels.

Establishment of these national policies could have a significant impact on the growth of the forest carbon industry in the future and could play a role in encouraging the full inclusion of forest carbon offsets into regulated markets.

While forest carbon expertise and policy supports appear to be improving in some parts of the world, the overall sense among interviewees is that the number of transactions will *not* significantly increase over the next three years *unless* forest carbon is integrated into a regulatory system – the particular concern here is the expected cost of forest carbon versus other offset types – or there is a significant rise in investors willing to take on risk and innovate around key bottlenecks, particularly project seed-funding. The reasons are two-fold. First, the upfront costs associated with developing forest carbon projects are high and the demand context uncertain, which together make the case for investment tough. Second, even when a forest carbon project is designed and implemented, current prices make it unlikely for forest carbon to be the primary, or even exclusive, financial driver of new land management practices. Rather, carbon revenues should be seen and structured as one of several mechanisms that will pay for and incentivize new approaches to land management.

Looking ahead

The road forward, while potentially vast in opportunity, is not for the faint-hearted. As discussed, large forest carbon projects are, and will remain, risky and complex undertakings across the full spectrum of issues: from a lack of regulatory context, comparatively low financial returns, with uncertain futures. On the other hand, forest carbon projects on timber concessions hold much opportunity, but also often offer a 'low risk, low reward' calculus for project developers.

For projects to succeed, it will be critical that they deliver benefits for forest-dependent communities and improve their rights, in addition to offering climate mitigation impacts. In addition, people will continue to care about the ecological value of forests beyond their carbon storage. Investors and project developers will need to continue proactively addressing these common concerns and engage with critics. Ensuring and demonstrating that carbon projects are managed for maintaining the flow of multiple ecosystem services will also help foster support.

Fortunately, forest carbon project developers have continued to build their development capacity and can now draw on twenty years of experience. Learning from past projects, investors and developers have better tools for screening opportunities, understanding expectations, and managing for multiple ecosystem services. At the same time, the above mentioned uncertainty surrounding the future of regulatory carbon markets remains a challenge, and a lack of policy direction in the United States and internationally has also tempered both investor and buyer willingness to engage in this market.

Moreover, trail blazers have developed significant industry infrastructure surrounding legal and policy frameworks, project standards and methodologies, and expert resources have matured and continue to do so, albeit at a smaller scale than what would otherwise be possible. If industry leaders want to advance the industry and remove existing obstacles to project development, efforts need to be made to establish political frameworks and adopt industry standards. It is also possible that the pledging of public funds to REDD will encourage institutional capacity and establish mechanisms for forest carbon transactions. Accomplishing these tasks is not easy; years of lessons learned along with the resulting tools will serve as the foundation for forest carbon markets in years to come. Greater clarity and uniformity could also speed up the adoption of forest carbon into regulatory policies and transition forest carbon from an emerging to an established market.

Annex 1: Detailed Project Screening Criteria

Given these many challenges, are there screening criteria that could be used to identify the most promising projects—above and beyond usual business assessments related to costs and internal rate of return?

In interviews, investors and project developers listed the criteria that they use, which have been assembled into a composite set that could be added to due diligence processes assessing potential forest carbon projects.

1. Site Screening

Does the area being considered for a forest carbon project have any of the following attributes:

- High population density?
- Insecure land tenure (either *de jure* or *de facto)*?
- Small land ownership parcels and large families, such as 10-50 people on a half hectare, upon which it is difficult to even engage in subsistence farming?
- Inadequate number of hectares to provide food for subsistence farmers/families?
- Recent history of declining agricultural yields due to land degradation and/or soil loss?
- Lack of coordination associations among multiple landowners/community members, with whom to negotiate?
- Low education levels?
- Low rates of employment and few opportunities in formal economic systems?
- High unemployment rates?
- Ongoing rapid migration into area, which could drive new natural resource use demands?
- High levels of deforestation pressure as a result of fuel wood for household cooking?
- Community antagonism to carbon transactions (and/or specific buyers)?
- Active land disputes?
- History of local government corruption?
- History of illegal logging?

If on government-owned lands:

- History of 'encroachment' on to public lands?
- Farmers operating on government owned land *without* recognized long-terms rights to enter into carbon transactions?

If several of these questions are answered in the affirmative, then this area is likely to be a high risk for a forest carbon project. It may be more suited for alternative approaches to forest conservation concurrent with creating alternative economic opportunities (potentially through more traditional approaches, such as micro-enterprise).

2. Technical Prospects

Does the area being considered for a forest carbon project have any of the following attributes:

- Existing applicable offset methodology? Offset standard? MRV approach?
- Potential to verify the project's emissions reductions? Get project on a registry?
- Experience with the type of forestry activities that you are planning in the area (e.g., tree planting)?
- Data on tree growth rates and other key biological data in that particular ecosystem?
- Access to key materials/inputs (e.g., seedlings of the appropriate species and in the right quantity, etc.)?
- Elevated risk of natural disaster, such as related to (1) drought, as indicated by recent rainfall patterns and projects, as well as inadequate replenishment rates of underground aquifers in recent years; (2) pests/disease?
- Ability to leverage remote sensing to monitor, thereby decreasing costs?

If not, are you prepared to invest on the long-term, including training and capacity-building for locals as well as ecological research, in order to undertake key tasks needed for project implementation and management?

3. National Policy Context

- Are environmental services and/or the role of forests considered in the national constitution in such a way that might guide future legislation to be more antagonistic of a forest carbon project?

If yes, the risk of national policy changes undermining the viability of the project may be unacceptable to investors.

Does the government have clear and supportive policies related to:

- Forest carbon transactions, including transference of emission reductions to foreign investors?
- Carbon rights?
- Timber rights?
- Land ownership rights/land tenure?
- National taxes on carbon transactions?
- Contract law?

- Are there government officials with authority, and technical capabilities, to clarify any questions—in a timely fashion—associated with legal and policy issues in terms of carbon transactions?
- If not, is there a willingness on behalf of the government to create such clarity?

If no, or if there is significant political instability, then investors may be unwilling to accept the risks of supporting projects in this country until policy issues are addressed.

4. On-the-Ground Partners

Do prospective partners have the necessary institutional mechanisms to oversee complex projects in place—as well as relationships and respect from other key parties? Aspects to consider are:

- Alignment of interests, goals, and land management (e.g., land owners agree to manage according to plan and not intercrop with illegal substances or conduct other practices that could undercut the project)
- Record-keeping skills and track record
- Financial management systems that are transparent, accountable, and have a clear track record over a course of multiple years
- Experience with flows of funds into the community that have yielded material measurable results (e.g., schools/clinics built, mills purchased, people trained, businesses expanded through loans, etc.)
- Positive community relations
- Strong landowner outreach programs
- Well-established stakeholder engagement skills
- Ideally, experience with ecological monitoring and tracking systems
- Positive government relations and experience negotiating productive projects with public authorities
- Legal rights to work on a forest carbon project and sell ecosystems services

If these mechanisms are not in place, then this prospective partner may not be prepared at this point to undertake a forest carbon project.

5. Agreement Prospects

- Will the proposed forest carbon project compensate all natural resource users who are being requested to change current practices? If so, how and by how much? Are these figures meaningful in the local economic context?
- Are there migrants coming into the area who could be future natural resource users? If so, how will this pressure be considered and mitigated?
- Are there prospects for monetary benefits to land managers throughout the life of the project (not just at inception, such as paid labor in tree-planting phase)? Are these ongoing/long-term benefits in terms of purchasing power in that particular area?
- Is there clarity on how to ensure fairness and free, prior, informed consent from rights holders?
- Will returns from forest-based activities be sufficient to withstand other social and economic pressures over time?
- Are there other benefits (e.g., agricultural yield increases, timber availability, etc.) that will be locally valued?
- What is the distribution system for these benefits and how well does it work?
- Will these benefits be perceived as fair by local stakeholders?
- Are there precedents for these kinds of agreements? Is there local experience with these kinds of agreements?

If no, what are the risks and potential responses?

Annex 2: Key Forest Carbon Project Standards and Guidelines

Clean Development Mechanism (CDM)
The Kyoto Protocol is a legally binding agreement under which 37 industrialized countries (as of late April 2010) have agreed to reduce their collective GHG emissions to an average of 5.4% below their 1990 emissions levels over the period 2008-2012. Three mechanisms provide the foundation of the regulated international Kyoto carbon market: Emissions Trading, JI, and the CDM. The CDM allows emitters in developed countries to purchase carbon offsets (Certified Emission Reductions or CERs) from approved and registered emission-reduction projects, including A/R projects, in developing countries. Developed countries can use CDM A/R offsets to meet their emission-reduction commitments, but only up to 1% of their base-year emissions, multiplied by five (roughly 183 $MtCO_2$ in total). To be eligible, projects must have started on or after January 1, 2000 on land that was not forested as of January 1, 1990. Projects select one of two crediting period options: a fixed 30-year crediting period, or a shorter period (up to 20 years) that can be renewed twice.
Voluntary Carbon Standard (VCS)
Efforts to develop the VCS were initiated by The Climate Group, the International Emissions Trading Association, and the World Economic Forum in late 2005. VCS' AFOLU projects cover afforestation, reforestation and re-vegetation (ARR), agricultural land management (ALM), IFM, and REDD. Credits verified to the standard are branded as Voluntary Carbon Units (VCUs). All VCUs are listed in the VCS Project Database. The VCS Registry System currently consists of the VCS Project Database and three international companies that are contracted to act as registries—APX Inc., Caisse des Dépôts, and Markit Environmental Registry. In the future, the system could be expanded to include additional registries. The VCS Registries issue, hold, transfer, and retire VCUs, and interact directly with the VCS Project Database to upload project documentation and obtain unique serial numbers for each VCU. Although the VCS was created as a base carbon-accounting standard, developers have the option of 'tagging' their VCUs with other standards such as the CCB Standards or SOCIALCARBON to provide proof that projects generate co-benefits including enhanced community development and improved biodiversity.
The Climate, Community and Biodiversity (CCB) Standards
The CCB Standards were developed by the Climate, Community and Biodiversity Alliance (CCBA). The CCB Standards are international in scope, focusing on land-based climate change mitigation projects, including primary or secondary forest conservation, reforestation, agro-forestry plantations, and REDD. The CCB Standards are focused on social and environmental impacts ('co-benefits') and do not include a mechanism for generating emission reductions certificates. To generate carbon credits, the CCB Standards are often paired with the VCS or another carbon offset verification standard. The CCB Standards' criteria include social and environmental safeguards to avoid harm and also require projects to improve the livelihoods of local communities and the conservation of biodiversity. While the CCB Standards are designed for site-based projects, the CCBA and CARE International are facilitating an initiative to develop REDD+ Social & Environmental Standards that may be applied to those government-led REDD+ programs that make a significant contribution to human rights, poverty alleviation, and biodiversity conservation. These new standards apply to policies and measures implemented at national, state or provincial level and do not replace the current CCB Standards for site-level projects.
Climate Action Reserve (CAR or the Reserve)
The Reserve emerged from the California Climate Action Registry (CCAR), a non-profit organization which was the result of a 2001 initiative by the State of California to oversee entity emissions reporting and offsets in that state. In September 2009, CAR's Forest Project Protocol 3.0 was adopted to verify the carbon sequestration benefits of forestry projects in avoided conversion of forestland to other uses, improved forest management, and reforestation of land. This latest version includes tools to address forest project definitions and requirements, quantifying and ensuring the permanence of net GHG reductions and removals, and so forth. Credits verified to the standard are branded Climate Reserve Tons (CRTs), or 'carrots' for short. CRTs are only issued ex-post and are held in the Reserve's own registry powered by APX. The CAR forest protocol takes a deliberately standardized approach, relying heavily on US Forest Service regional data and other official datasets for the calculation of baselines and establishing additionality. The CAR protocol requires a 100-year crediting period and projects must enter into a project implementation agreement with the Reserve. Project developers

must adhere to sustainable forestry and natural forest management requirements. Avoided conversion projects must also establish a conservation easement and are only eligible on private land or land that has been transferred to public ownership. Issues of permanence are addressed by requiring landowners to commit to maintaining carbon stocks for 100 years, with third-party monitoring and verification, and through the maintenance of a buffer pool.

Plan Vivo Standards

Plan Vivo was developed in 1994 by the Edinburgh Centre for Carbon Management (ECCM) in partnership with El Colegio de la Frontera Sur (ECOSUR). The actual standards are administered by the Plan Vivo Foundation, formerly BioClimate Research and Development, a registered charity based in Scotland. Plan Vivo accepts a range of Land Use, Land-Use Change and Forestry (LULUCF) projects, including A/R, agro-forestry, restoration, conservation, IFM, and REDD. Unlike other standards, Plan Vivo does not provide methodologies. Rather, each project must devise its own to be adapted to the specific realities of the project, and it must be reviewed by external experts. Projects are issued a Plan Vivo Certificate with a unique serial code for each ton of carbon dioxide sequestered or reduced. In addition, Plan Vivo has begun to use the Markit Environmental Registry to issue, track, and retire certificates. Projects generally originate with a small community or group of landowners, following a bottom-up approach to increase communities and land over time. In line with the grassroots approach, the Foundation aims to increase local capacity through knowledge, skills, and resources transfer to developing countries. Plan Vivo also requires a minimum of a 10% buffer reserve of credits, with the norm generally being around 20%. In addition, Plan Vivo sets a goal for at least 60% of carbon revenues directed towards communities with a minimum of $\$6/tCO_2$ needed to achieve this.[16]

ISO 14064

ISO 14064 is a GHG project-accounting standard developed by the International Organization for Standardization (ISO) beginning in 2002 and launched in the spring of 2006. The standard is meant to be applicable regardless of a country's current climate policy and does not apply restrictions on project types, size, location, and crediting period.[17] The ISO 14064 standard consists of three parts, which can be used independently or as an integrated set. The first part (14064-1) specifies requirements for designing and developing organization- or entity-level GHG inventories. The second part (14064-2) details requirements for quantifying, monitoring, and reporting emission reductions and removal enhancements from GHG projects. The third part (14064-3) provides requirements and guidance for GHG information validation and verification.[18] Unlike standards approving scientific methodologies, ISO 14064 offers only general guidance. For instance, ISO mentions that additionality must be taken into account, but does not require a specific tool or test. Tools used are defined by the GHG program or regulation under which ISO 14064 is used. ISO 14065 was recently developed to address specific principles and requirements for greenhouse gas validation and verification. ISO 14066 and 14067 are both currently under development to address competence requirements for greenhouse gas validation teams and verification teams, as well as the quantification of the carbon footprint of products.[19]

[16] Carbon Positive, "Plan Vivo Standards," carbonpositive, http://www.carbonpositive.net/viewarticle.aspx?articleID=1620.

[17] Stockholm Environment Institute, "ISO 14064-2," Carbon Offset Research & Education, http://www.co2offsetresearch.org/policy/ISO14064.html

[18] Global Warming, "ISO 14064," http://www.global-greenhouse-warming.com/ISO-14064.html

[19] ISO, "ISO/DIS 14066," International Organization for Standardization, http://www.iso.org/iso/catalogue_detail.htm?csnumber=43277.

American Carbon Registry (ACR) Forest Project Standard

In 1996, experts at the Environmental Defense Fund founded the Environmental Resources Trust (ERT) and launched the GHG Registry, now known as the American Carbon Registry (ACR).[20] ACR was the first private voluntary greenhouse gas emissions registry in the United States, and in 2007, both ERT and ACR joined Winrock International. ACR provides carbon technical services for greenhouse gas accounting, protocol development, offset and corporate GHG inventory registration, as well as OTC offset transactions and retirements.[21] The Forest Carbon Project Standard, launched in March 2009, is available for A/R, IFM, and REDD projects within the US or non-Annex I countries. To address permanence, ACR offers three tools: a buffer pool, an insurance policy to replace the credits, and the replacement of loss with other credits. Projects choosing the buffer pool shall use the VCS buffer tool. VCS or CDM tools are also to be utilized to address leakage. In total, ACR accepts methodologies from CDM, US Environmental Protection Agency (EPA) Climate Leaders, VCS and World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) GHG Protocol, as well as the CCB Standards for co-benefits. ACR uses the Markit Environmental Registry, and credits verified to the standard are branded as Emissions Reduction Tons (ERTs). Information on offsets registered, transferred, tracked, and retired is available to the public.

CarbonFix Standard (CFS)

The CarbonFix Standard (CFS) is a product of the non-profit association CarbonFix, which was founded in 1999 and registered in Germany in 2007 to support the potential for climate forestation projects. The standard applies to A/R but not to IFM and avoided deforestation – or REDD – activities. To utilize the CFS, projects must be in areas that have not been forested 10 years prior to the start date, and 30% of credits are required to be retained as a buffer to account for project shortfalls. In terms of methodology, CFS only accepts its own, which is based on Intergovernmental Panel on Climate Change (IPCC) good practice guidelines and is supposed to be aligned with the CDM to the extent possible. For those project developers who want to maximize environmental and social benefits without duplicating validation costs, CFS recognizes the certification schemes of the Forest Stewardship Council (FSC) and the CCB Standards. The latest, Version 3.0, was released in August 2009.[22] It includes an improved approach to combined certification with the CCB Standards and FSC, the ability to certify carbon credits ex-ante and post, and a new eligibility criterion allowing land that was recently destroyed by force majeure to be eligible for CO_2 crediting.[23] CarbonFix has its own registry and delivers a unique certificate ID for each project. CarbonFix has started to use Markit as a third-party registry.[24]

[20] American Carbon Registry, "About Us," American Carbon Registry , http://www.americancarbonregistry.org/aboutus/about

[21] Ibid.

[22] CarbonFix e.V. *Carbon Fix Standard Version 3.0*, August 2009, *available at* http://www.carbonfix.info/chameleon//outbox/public/189/CarbonFix-Standard-v30.pdf

[23] Carbon Fix e.V., "Newsletter of the Carbon Fix Standard Issue No. 10," Carbon Fix Standard, http://www.carbonfix.info/News/Newsletter/Newsletter-No10.html

[24] Paulo Lopes, "Review of Carbon Fix Standard," http://reducecarbon.wordpress.com/v-carbonfix-standard/.

Annex 3: Registries – An Overview[25]

Examples of Independent Credit-Accounting Registries and Registry Infrastructure Providers	
APX[26]	APX is a privately held energy and environmental markets infrastructure provider that develops and manages registries for several voluntary carbon market standards. It is the system behind the Climate Action Reserve and Gold Standard registries, as well as one of the three registries in the VCS registry system and provider of the central VCS Project Database. The company also serves as the infrastructure provider for all North American renewable energy markets for compliance and voluntary renewable energy certificate (REC) issuance, tracking, purchasing and retirement, launching the latest in 2009 for the states of Michigan, Missouri and North Carolina.
Caisse des Dépôts[27]	Caisse des Dépôts was one of three registries initially chosen in 2008 by the VCS Association to host the VCS registry system. The CDC VCS registry is managed by its affiliate CDC Climat. It manages all aspects of VCUs: issuance, holding, transfer, acquisition, cancellation and retirement. The registry is aimed particularly at offsetters and project developers and is linked to the VCS' central project database. Registry information is not available to the public.
GHG CleanProjects Registry[28]	Launched in 2007, the Canadian Standards Association's (CSA) GHG CleanProjects™ Registry was developed to list and de-list GHG reduction projects that result in emissions reductions. Projects seeking to have their reductions serialized in the registry must be quantified and verified according to the international series of ISO 14064-2/3 standards for project level greenhouse gas emission reductions and reporting. Once emissions reductions are independently third-party verified, they are eligible to be serialized and to become Verified Emission Reductions-Removals (VERRs) expressed in tCO_2. Users do not have to create an account to view the registry and may search by different criteria including project or proponent name.
Markit[29]	The Markit Environmental Registry (MER) Service provides registry platforms for all forms of environmental assets, including carbon credits, water and biodiversity certificates. Markit operates its own independent registry and also provides registry services for a full range of credit standards including the VCS registry system, Social Carbon, the MER Meta Registry, Brasil Mata Viva, ISO, Plan Vivo and the CCBA. The registry provides full settlement services through an alliance with the Bank of New York Mellon, and connections to many trading facilities including the new Carbon Trade Exchange for clients to buy and sell registered credits. Organizations listing information on the registry may choose the level of transparency in their accounts. There are separate public and members-only sections of the website, but the public may view everything in the registry except information which Markit customers have requested be kept confidential. In 2009, Markit acquired the TZ1 registry system from NZX Limited, as well as New Zealand's Registry.

[25] Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T. 2010. *Building Bridges: State of the Voluntary Carbon Markets 2010.* Washington, DC: Forest Trends, Ecosystem Marketplace. *(*http://forest-trends.org/publication_details.php?publicationID=2433*).*

[26] http://www.apx.com/environmental/carbon-market-infrastructure.asp

[27] http://www.vcsregistry.caissedesdepots.com

[28] http://www.ghgregistries.ca/cleanprojects/index_e.cfm

[29] http://www.markitenvironmental.com

Standard- and Exchange-Specific Registries

Standard providers are increasingly creating their own registry infrastructure or linking with infrastructure providers to issue and track credits. Likewise, many exchanges have created their own or have linked with external registries. While the general concept of linkage is similar across registries, the set-up of the infrastructure systems and the rules governing each system vary between different standards' registries.

The following table summarizes some of the differences between standard- and exchange-specific registries.

Registry Infrastructure Providers			
Registry or Infrastructure Provider	**Market Position**	**Entities Served (in Case of Infrastructure Provider)**	**Transparency**
APX	Infrastructure	VCS, Gold Standard, CAR	Project info public; Account info public; Listing eligibility requirements clear
BlueRegistry	Quasi-independent	VER+ and others	Project info public; List of account holders public; Listing eligibility requirements clear
Caisse des Dépôts	Infrastructure	VCS	No public info
GHG Clean Projects Registry	Independent	Not applicable	Project information public; List of account holders public; Listing eligibility requirements clear
Markit Environmental Registry (formerly TZ1)	Infrastructure/ Independent	VC; Brasil Mata Viva; CarbonFix; CCB Standards; Cosain; ISO 14064; Permanent Forest Sink Initiative; Plan Vivo; Social Carbon	Most project info public; Some account info public; Listing eligibility requirements clear

Examples of Standard-Specific Registries			
Registry	**Affiliated Standard/ Exchange**	**Infrastructure Provider**	**Transparency**
ACR	ACR Standard	Internal	Project info public; All account info public; Listing eligibility requirements clear
CarbonFix Registry	CarbonFix	Markit	Project info public; Some account info public; Listing eligibility requirements clear
CCB Standards Project Registry	CCB Standards	Projects listed on CCB Standards website; CCB Standards label can be added to VCUs on VCS registries for CCB Standards Verified projects	Project info public; Some account info public; Listing eligibility requirements clear
CAR	CAR	APX	Project info public; List of account holders public; Listing eligibility requirements clear
CCX Offsets[1] Registry	CCX	Internal	Some project info public; Some account info public; Listing eligibility requirements clear
Gold Standard Registry for VERs	Gold Standard	APX	Project info public; Most account info public; Listing eligibility clear
Plan Vivo Registry	Plan Vivo	Markit	Project info public; Some account info public; Listing eligibility requirements clear
SOCIALCARBON® Registry	SOCIALCARBON® Standard	Markit	Project info public; Some account info public; Listing eligibility requirements clear
VCS Registry System	VCS	APX, Markit, Caisse des Dépôts	Full transparency on all project and VCU information

Source: Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T. 2010. *Building Bridges: State of the Voluntary Carbon Markets 2010.* Washington, DC: Forest Trends, Ecosystem Marketplace. *(*http://forest-trends.org/publication_details.php?publicationID=2433*).*

[1]Fee information availability varies among standards; only publically available information is presented in this table.
[2]Total refers to the entire volume of VERs or projects registered during the lifetime of the registry as of April 2009, except where otherwise noted.

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the katoomba group

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CHESAPEAKE FUND

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