

Yale University

EliScholar – A Digital Platform for Scholarly Publishing at Yale

Forestry & Environmental Studies Publications
Series

School of Forestry and Environmental Studies

12-2009

Carbon Finance II: Investing in Forests for Climate Protection

Jamie Carlson

Center for Business and the Environment at Yale

Bryan Garcia

Center for Business and the Environment at Yale

Claire Jahns

Center for Business and the Environment at Yale

Eric Roberts

Center for Business and the Environment at Yale

Katie Schindall

Center for Business and the Environment at Yale

Follow this and additional works at: <https://elischolar.library.yale.edu/fes-pubs>

Part of the [Environmental Sciences Commons](#), and the [Finance and Financial Management Commons](#)

Recommended Citation

Carlson, Jamie; Garcia, Bryan; Jahns, Claire; Roberts, Eric; and Schindall, Katie, "Carbon Finance II: Investing in Forests for Climate Protection" (2009). *Forestry & Environmental Studies Publications Series*. 41.

<https://elischolar.library.yale.edu/fes-pubs/41>

This Article is brought to you for free and open access by the School of Forestry and Environmental Studies at EliScholar – A Digital Platform for Scholarly Publishing at Yale. It has been accepted for inclusion in Forestry & Environmental Studies Publications Series by an authorized administrator of EliScholar – A Digital Platform for Scholarly Publishing at Yale. For more information, please contact elischolar@yale.edu.

Carbon Finance II

Investing in Forests for Climate Protection

Jaime Carlson, Bryan Garcia, Claire Jahns, Eric Roberts, and Katie Schindall, EDITORS

“Financial innovation in conservation is vital to the protection of ecosystems, lands, forests, and wildlife throughout the world. *Carbon Finance II: Investing in Forests for Climate Protection* provides critical insights from practitioners leading key efforts to shape emerging forest carbon markets and to advance the field of conservation finance.”

James Levitt
Director, Program on Conservation Innovation at Harvard Forest, Harvard University

“As the U.S. re-engages in the international climate negotiations, it will be important that forests play an important role in the nation’s strategy to reduce greenhouse gas emissions. This publication highlights some of the key issues and opportunities for forest carbon market investors.”

Sonia Medina
U.S. Country Director, EcoSecurities

“*Carbon Finance II: Investing in Forests for Climate Protection* is an acknowledgement of the critical role forests play in climate protection. It addresses not only the challenges, but also the policy and investment solutions involved in bringing forests into carbon markets.”

Radha Kuppalli
Director, New Forests, Inc.

Center for
BUSINESS AND THE ENVIRONMENT
at Yale

Yale School of Forestry
& Environmental Studies
PUBLICATION SERIES

195 Prospect Street
New Haven, Connecticut 06511
USA

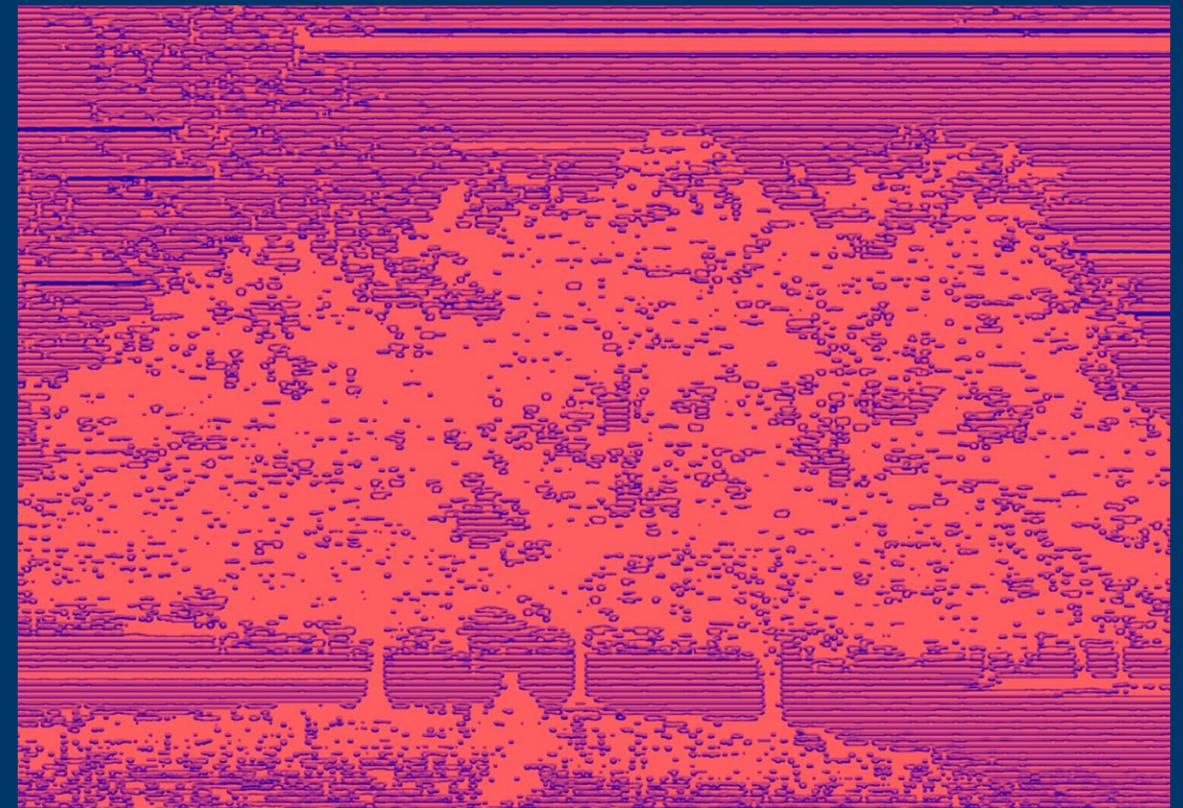
Carbon Finance II

Investing in Forests for Climate Protection

With a Foreword by R.K. Pachauri

Jaime Carlson, Bryan Garcia, Claire Jahns, Eric Roberts,
and Katie Schindall, EDITORS

Center for Business and the Environment at Yale



**Yale F&ES Publication Series
Report Number 22**

PUBLICATION SERIES EDITOR	Jane Coppock
REPORT TITLE	Carbon Finance II: Investing in Forests for Climate Protection
REPORT DATE	December 2009
REPORT EDITORS	Jaime Carlson, Bryan Garcia, Claire Jahns, Eric Roberts, and Katie Schindall
COVER IMAGE	Kate Carman
CHAPTER BIO PAGE DESIGN	Jude Wu. For a more detailed description of the background photos used for the bio pages, see About the Bio Pages at the end of the report.
BIO PAGE PHOTO CREDITS	Alden Warner of The Nature Conservancy
COVER DESIGN	Bryan Gillespie, Yale Printing & Publishing Services
PAGE LAYOUT	Dorothy Scott, North Branford, CT
PRINT ON DEMAND	Yale Printing and Publishing Services. Mohawk 100% recycled paper. All electricity used in Mohawk manufacturing is offset by renewable wind-power. Mohawk is FSC-certified.
ACKNOWLEDGEMENTS	Special thanks to the Emily Hall Tremaine Foundation and the Henry P. Kendall Foundation for their support of the Carbon Finance Speaker.
	 Tremaine Foundation  HENRY P. KENDALL FOUNDATION
TO OBTAIN COPIES	To download free chapter pdfs or order a bound copy, go to www.yale.edu/cbey/carbonfinance2009 or to the F&ES Publication Series website at www.environment.yale.edu/publications .
DISCLAIMER	The research, opinions, and findings contained in this publication are those of the authors and do not necessarily reflect the positions of institutions with which they are affiliated or the Yale School of Forestry & Environmental Studies.

© 2009 Yale School of Forestry & Environmental Studies. This report or any portion of it can be reproduced without written permission so long as proper attribution is made.

Center for
BUSINESS ^{AND} ENVIRONMENT
at Yale

Joining the strengths of two pre-eminent professional schools, the Yale School of Management and the Yale School of Forestry & Environmental Studies, the Center for Business and the Environment at Yale (CBEY) supports innovative approaches to environmental problem-solving through education, advocacy, and cutting-edge research.

www.yale.edu/cbey

PUBLICATION SERIES Yale School of Forestry & Environmental Studies

To capture exciting environmental projects at Yale of interest to a broad professional audience, the Yale School of Forestry & Environmental Studies Publication Series issues selected work by Yale faculty, students and colleagues each year in the form of books, bulletins, working papers and reports. All publications since 1995 are available for order as bound copies, or as free downloadable pdfs, at our online bookstore at www.yale.edu/environment/publications. Publications are produced using a print-on-demand system and printed on 100% recycled paper. For further information or inquiries, contact Jane Coppock, Editor of the F&ES Publication Series, at jane.coppock@yale.edu.

Carbon Finance II

Investing in Forests for Climate Protection

With a Foreword by R. K. Pachauri

Jaime Carlson, Bryan Garcia, Claire Jahns, Eric Roberts,
and Katie Schindall, **EDITORS**

Center for Business and the Environment at Yale

Table of Contents

Foreword	1
<i>Dr. R. K. Pachauri, Chairman of the Intergovernmental Panel on Climate Change and Director, Yale Climate and Energy Institute</i>	
Editors' Overview	3
PART I: MANAGING FORESTS FOR DYNAMIC MARKET FORCES	
Chapter 1	9
People, Forests and Land Use: A History of Resource Exploitation, Conservation, and Sustainable Management	
<i>Mark Ashton, Professor of Silviculture and Forest Ecology and Director of School Forests Yale School of Forestry & Environmental Studies</i>	
Chapter 2	33
Protecting Forests and Lands through Environmental Markets and Finance	
<i>Mark Tercek, President and CEO, The Nature Conservancy</i>	
Chapter 3	51
Investing in Forests and Lands: An Investor's Primer	
<i>Deborah Spalding, Managing Partner, Working Lands Investment Partners, LLC</i>	
PART II: EVOLUTION OF FOREST CARBON POLICY AND MARKETS	
Chapter 4	71
Lessons from the Voluntary Forest Carbon Markets: Applications to Emerging Compliance Markets	
<i>Edwin Aalders, Director, International Emissions Trading Association Katherine Hamilton, Associate Director, Ecosystem Marketplace</i>	
Chapter 5	89
Critical Insights into the U.S. Carbon Markets	
<i>Justin Felt, Product Manager, Point Carbon Elizabeth Zelljadt, Senior Analyst, Point Carbon</i>	

Chapter 6	107
Developing a Forest Carbon Market in the U.S.: A Look at the Regional Greenhouse Gas Initiative	
<i>Alec Giffen, Director, Maine Forest Service</i>	
<i>Ellen Hawes, Policy Analyst-Forestry, Environment Northeast</i>	
<i>Jasmine Hyman, Director of Programs and Partnerships, The Gold Standard</i>	
Chapter 7	127
U.S. Forest Carbon Policy: The Role of State and Federal Governments	
<i>Laurie Wayburn, President and Co-Founder, Pacific Forest Trust</i>	
PART III: EMERGING ISSUES AND OPPORTUNITIES	
Chapter 8	147
Copenhagen and Beyond: Expert Perspectives on the International Climate Negotiations	
<i>James Cameron, Executive Director and Vice Chairman, Climate Change Capital</i>	
<i>Bradford Gentry, Director, Center for Business and the Environment at Yale</i>	
<i>Nancy Kontou, Head of Cabinet to the EU Environment Commissioner Stavros Dimas</i>	
Chapter 9	165
After the Crunch: The Future of Sustainable Investing and Carbon Finance	
<i>Cary Krosinsky, Vice President, Trucost</i>	
<i>Nick Robins, Director, HSBC Climate Change Center of Excellence</i>	
Chapter 10	179
Bringing Security to Forestry Investors Worldwide	
<i>Phil Cottle, Managing Director, ForestRe</i>	
Chapter 11	197
Fast Company: Yale Idealists Slowing Global Warming through Forest Investment	
<i>Michael Coren, Consultant, Climate Focus</i>	
<i>Marc Hiller, Associate, International Forestry Investment Advisors</i>	
<i>Jason Patrick, Vice President, Carbon Markets, Bank of America Merrill Lynch</i>	
<i>Mark Wishnie, Managing Director, Equator, LLC</i>	
Acknowledgements	215
Editor Biographies	218
About the Bio Pages	221

Foreword

R. K. Pachauri

Director-General, The Energy and Resources Institute (TERI)

Chairman, The Intergovernmental Panel on Climate Change (IPCC)

Director, Yale Climate and Energy Institute (YCEI)

Through sustainable forest management and avoided deforestation, the forestry sector has the potential to play a major role in mitigating climate change. Forests capture and store carbon in wood and soil, acting as valuable carbon sinks. However, due to extensive forest degradation and deforestation, the forestry sector has become a significant source of greenhouse gas emissions. According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), deforestation is occurring at a rate of 12.9 million hectares per year, leading to a decrease of about 4,000 MtCO₂ in global net carbon stocks in forest biomass. The IPCC estimates that, overall, the forestry sector has contributed to approximately 18 percent of total anthropogenic greenhouse gas emissions in recent years due to unsustainable forest management.

In addition to carbon capture and sequestration, forests provide a myriad of valuable ecosystem services, including water filtration, erosion control, and biodiversity preservation. Furthermore, forest management has important socioeconomic implications, as hundreds of millions of households worldwide depend on forest resources for their livelihoods. When managed properly, therefore, forests have the potential to provide both valuable ecosystem services and social goods on the country and community levels. However, this potential has yet to be fully realized, in large part due to current land use policies and profitability incentives of deforestation. In order for forests to reach their climate protection potential, it is clear that significant changes in the forest management sector must be achieved.

Carbon Finance II: Investing in Forests for Climate Protection, released by the Center for Business and the Environment at Yale, presents a catalyst for change in forest management – bringing forests under the umbrella of cap-and-trade greenhouse gas emission reduction policies. The purchase and trade of carbon offsets provides an economic incentive for countries to invest in proper forest management techniques. When properly designed, local communities also can benefit significantly from avoided deforestation (REDD) projects.

The chapters of this report, drawn from lectures given during the 2008-2009 Carbon Finance Speaker Series at the Yale School of Forestry & Environmental

Studies, discuss prospects and impediments for forest carbon policies from the perspective of a broad spectrum of professionals. Many of the chapters focus on crucial issues related to implementation-oriented policymaking, examining how rules can be devised to ensure widespread participation, active trading of carbon offsets, and permanence and reliability of the carbon credits. The chapters also contain insightful discussions on such topics as the need for policy and market transparency in integrating forest management into environmental policies, the importance of national and global coordination and cooperation in forest management policy, and the complex factors involved in implementing and measuring REDD projects. Discussion of these relevant issues and themes provides a step towards the establishment of sound forest policy, a step which is all the more salient as the international community comes together to form a global climate change agreement.

As the Fourth Assessment Report of the IPCC states, “Forestry can make a very significant contribution to a low-cost global mitigation portfolio that provides synergies with adaptation and sustainable development. However, this opportunity is being lost in the current institutional context and lack of political will to implement and has resulted in only a small portion of this potential being realized at present.” By presenting the opportunities and challenges faced in forming successful forest carbon policy and raising awareness of various viewpoints about forest carbon financing, this report plays a crucial role in encouraging stakeholders to adopt new forest management practices and to invest in forests as a viable global warming mitigation option.

Editors' Overview

Carbon Finance II: Investing in Forests for Climate Protection is a collection of lectures given during the 2008-2009 Carbon Finance Speaker Series at the Yale School of Forestry & Environmental Studies. The annual series is hosted by the Center for Business and the Environment at Yale and supported by the Emily Hall Tremain Foundation and the Henry P. Kendall Foundation. The 2008-2009 speaker series focused on forest carbon and the opportunities and obstacles to including forests in greenhouse gas emission reduction policies, carbon markets, and cap-and-trade systems.¹

Many investors and environmentalists alike believe that inclusion of forests in climate compacts and related financial markets would facilitate improved forest management by introducing a new revenue stream: the sale of forest-based carbon sequestration credits. Skeptics, however, caution that over-zealous inclusion of offsets in regional, national, and global programs could undermine absolute emission reduction targets. They argue that forest offsets may not provide the sequestration or ecological benefits touted by forest project owners. The speakers in this series are all practitioners at the intersection of land management, finance, and policymaking. They range from academics, state-level policymakers, and forest conservationists to entrepreneurs, forestry investors, and insurance professionals. Many have an optimistic perspective on the role forests will play in carbon reductions. However, they also discuss at length the barriers facing forest carbon markets.

This speaker series occurred during a dynamic period, one that saw dramatic changes in world financial markets as well as a push for international and U.S. carbon policy. Risk, both from regulations and markets, is a unifying theme throughout the talks. The topics discussed in this series highlight major market trends and, in many cases, underscore the importance of policy to providing market security to the carbon sector. Speakers highlight the largely untapped opportunity in forest carbon, but also address the unique risks faced by this new market.

Forests, in many cases, are under industrial or marginalized ecological management regimes that are highly sensitive to changes in the policy and market trends that impact the value of timber prices, carbon stocks, and opportunity costs associated with alternative land use. To reflect this shifting landscape, the editors have chosen to leave text from the lectures intact with dated references in order to highlight the critical changes that policy decisions and capital market trends can have on forest carbon markets. See Figure 1 for a simplified timeline of major international

¹ Lectures from the 2007-2008 Carbon Finance Speaker Series were published as *Carbon Finance: Environmental Market Solutions to Climate Change*, Yale School of Forestry & Environmental Studies Publication Series Report Number 18 (Fall 2008). For more information on forest carbon, see *Forests and Carbon: A Synthesis of Science, Management, and Policy for Carbon Sequestration in Forests*. Yale School of Forestry & Environmental Studies Publication Series Report Number 23 (Fall 2009). Both reports, as well as the current volume, are available as free downloadable pdfs or for purchase as bound volumes at www.environment.yale/publications or at

and U.S. climate change policy and carbon market developments and expected developments from September 2008 through December 2009 and beyond. What follows is a chapter-by-chapter description of the contents of the volume.

Part I: Managing Forests for Dynamic Market Forces

Investors have taken an interest in forest carbon as a result of the carbon prices in regional and international markets and increasing discussion of forest offsets as an approved source of emission allowances. The first group of lectures presented in this book, *Managing Forests for Dynamic Market Forces*, opens the discussion with a historical perspective on forest management in response to market drivers and then addresses the current market forces at play in nascent international and U.S. carbon markets. Yale Professor Mark Ashton's opening piece, "People, Forests and Land Use: A History of Resource Exploitation, Conservation, and Sustainable Management," puts carbon in the context of thousands of years of active forest management for market production, be it timber, tea, or real estate. Presented in this way, one can see that carbon is simply a new forest product, and that the same types of market forces will affect its production as have affected other forest products over time. Mark Tercek, President and CEO of The Nature Conservancy (TNC), focused his talk on "Protecting Forests and Lands through Environmental Markets and Finance." As part of his broader remarks, Tercek discusses TNC's experience with a long-running Reducing Emissions from Deforestation and Degradation (REDD) project in Bolivia. He highlights the importance of balancing ecological, economic, and social concerns, and argues that the best sequestration projects will not only maximize just one of these values but rather all three. The final chapter in this section is Deborah Spalding's view from the world of private equity, "Investing in Forests and Lands: An Investor's Primer." Spalding, a Managing Partner of Working Lands Investment Partners, LLC, delves into the challenges faced by investors who seek to use carbon markets as another source of revenue in their ecosystem services toolboxes. She uses an actual timber-based land management project in the southeastern United States to illustrate her frank discussion of whether or not carbon will materialize as a significant revenue stream for purely profit-oriented investors.

Part II: Evolution of Forest Carbon Policy and Markets

The second section of the report takes a critical look at the voluntary and regulated markets for forest carbon to date, and examines how the ever-changing policies that define the markets attempt to address the concerns of conservationists, climate scientists, landowners, and investors. As discussed by the speakers, the subtle differences in market definitions of "forest carbon" have complicated debate over sequestration-based offsets and their validity as perceived by policymakers, the NGO community, investors, and the general public. Edwin Aalders, Director of the International Emissions Trading Association, and Katherine Hamilton, Associate Director at Ecosystem Marketplace, discuss the voluntary market for forest carbon in the fourth chapter, "Lessons from the Voluntary Forest Carbon Markets: Applications

to Emerging Compliance Markets.” They review the accounting standards currently in place in the voluntary market and draw insights as to which rules will likely be adopted into the compliance-driven market.

Justin Felt and Elizabeth Zelljadt of Point Carbon then provide a thorough overview of the state of U.S. carbon policy and markets in their lecture, “Critical Insights into the U.S. Carbon Markets.” They discuss the three U.S. and Canadian regional cap-and-trade programs in place – the Regional Greenhouse Gas Initiative (RGGI) in the Northeast, the Western Climate Initiative (WCI), and the Midwest Accord – as well as the Lieberman-Warner Climate Security Act of 2008 (S. 3036). The Lieberman-Warner Climate Security Act failed to pass the Senate during the summer of 2008 but foreshadowed many elements of the 2009 Clean Energy, Jobs, and American Power Act (S. 1733), which was introduced into the Senate in September 2009 and is undergoing committee review as this publication goes to press. Felt and Zelljadt also present a brief overview of the forestry standards that currently define projects in the regional compliance and voluntary U.S. markets, and suggest that elements of these standards may define forest carbon offsets in a future U.S. compliance market.

Next, a group of policy practitioners and advocates takes a closer look at one regional U.S. policy’s definition of forest carbon and what it means for the market. Director of the Maine Forest Service Alec Giffen, Ellen Hawes of Environment Northeast, and Jasmine Hyman of The Gold Standard present a “lessons learned” analysis of their experience developing forest carbon policy under RGGI in Chapter 6, “Developing a Forest Carbon Market in the United States: A Look at the Regional Greenhouse Gas Initiative.” They explore the opportunities and limitations of including forests as an approved offset project type, including accounting for leakage and proving project additionality. They advocate a programmatic approach to including forests in a cap-and-trade policy as one broad tactic for ensuring project quality. This discussion of forest carbon project quality continues with Pacific Forest Trust President Laurie Wayburn’s talk, “U.S. Forest Carbon Policy: The Role of State and Federal Governments.” Wayburn advocates a “no net loss” approach to carbon accounting that would cover both public and private lands, and could be overseen and funded by a number of regulatory bodies. She uses the Pacific Forest Trust’s 2,200-acre Van Eck Forest Project in Northern California as a model for successful implementation of a forest carbon project that uses improved management for sequestration and avoided deforestation to generate credits that are currently being sold into the marketplace. The project is enrolled in the Climate Action Registry, which is the official project registry of California’s Global Warming Solutions Act.

Part III: Emerging Issues and Opportunities

The final section of the volume, *Emerging Issues and Opportunities*, moves beyond forest carbon policy and into larger issues such as international climate negotiations, socially responsible investing, and carbon credit insurance. It also includes a forward-looking roundtable discussion of how carbon finance has fared in the recent financial crisis and what role forests are likely to play in combating climate change.

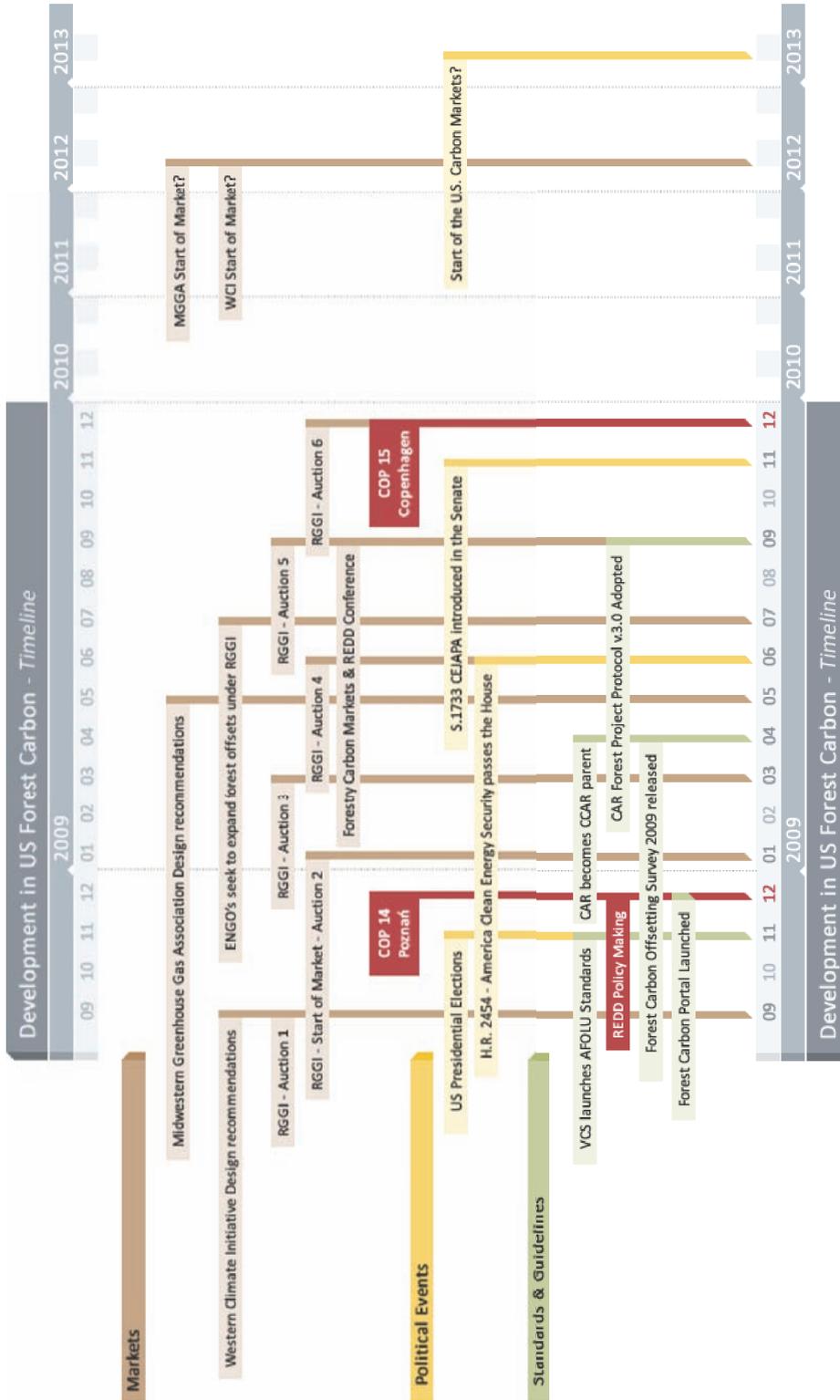
In Chapter 8, “Copenhagen and Beyond: Expert Perspectives on the International Climate Negotiations,” James Cameron, Executive Director and Vice Chairman of Climate Change Capital, and Nancy Kontou, Head of Cabinet to the EU Environment Commissioner Stavros Dimas, along with moderator and Director of the Center for Business and the Environment at Yale Bradford Gentry, describe the international climate negotiations process and some prospects for the upcoming Conference of the Parties in Copenhagen – COP 15. They stress the importance of establishing a consensus on climate change policy for the continued development of carbon markets around the world. A fully functioning carbon market, brought about by international and domestic climate policies that demand significant greenhouse gas emission reductions, is a necessary first step toward the establishment of any market for forest carbon, in their view.

The next two lectures in this section turn to the investment and risk associated with such markets. In “After the Crunch: The Future of Sustainable Investing and Carbon Finance,” Cary Krosinsky, Vice-President of Trucost, and Nick Robins, Director of the HSBC Climate Change Center of Excellence, provide a framework for understanding sustainable investing from both a macro and a micro perspective. Recognition of carbon emissions and carbon credit issues in financial markets is growing, but, as Krosinsky and Robins discuss, this understanding is still constrained by insufficient accounting for the externalized ecological and social costs of potential investments. In the next talk, Phil Cottle addresses the critical issue of forest carbon credit risk management in “Bringing Security to Forestry Investors Worldwide.” Cottle, Managing Director of London-based forest insurance company ForestRe, discusses the general scope of insurance before building on this framework through a forest-specific lens, citing examples and considering risk trends unique to this application. Cottle introduces the reader to possible future forest carbon insurance products, highlighting the market demand that such products would aim to fulfill.

The series concludes with “Fast Company: Yale Idealists Slowing Global Warming through Forest Investment.” This group discussion highlights the perspectives and experience of four graduates of the Yale School of Forestry & Environmental Studies: Michael Coren, a Consultant at Climate Focus; Marc Hiller, an Associate at International Forestry Investment Advisors; Jason Patrick, Vice-President of Carbon Emissions at Bank of America-Merrill Lynch, and Mark Wishnie, Managing Director of Equator, LLC. In addition to sharing career and professional advice directed at the students in the audience, they engage on a range of topical issues, from the impact of the financial crisis on their businesses and investors to what investors look for in potential greenhouse gas mitigation schemes.

The complexities of and opportunities for including forests in greenhouse gas emission reduction policies, cap-and-trade systems, and carbon markets is evident throughout the report. Achieving better understanding of the risks, costs, and benefits involved, and creating standards from that understanding, will be critical to the success of future markets that can both help to mitigate the effects of climate change and facilitate the sustainable management of forests globally. It is our hope that the publication of lectures from this speaker series will help to augment the knowledge and advance the discussions needed to achieve that goal.

Figure 1 Recent major international and U.S. policy and market developments



People, Forests and Land Use: A History of Resource Exploitation, Conservation, and Sustainable Management

Mark Ashton

*Morris K. Jessup Professor of Silviculture and Forest Ecology
Director of School Forests
Yale School of Forestry & Environmental Studies*



September 9, 2008
5:00 to 6:30 p.m.
Luce Hall
34 Hillhouse Avenue

Professor Mark Ashton conducts research on the biological and physical processes governing the regeneration of natural forests and on the creation of their agroforestry analogs. In particular, he seeks a better understanding of regeneration establishment among assemblages of closely-related trees. His long-term research concentrates on tropical and temperate forests of the Asian and American realms. His field sites within these regions were selected specifically to allow comparison of growth, adaptation, and plasticity within and among close assemblages of species that have evolved within forest climates with differing degrees of seasonality. Findings from these studies have theoretical implications for understanding the maintenance of diversity of tree species in forested ecosystems and the adaptability of forests to change in climate. The results of his research have been applied to the development and testing of silvicultural techniques for restoration of degraded lands and for the management of natural forests for a variety of timber and nontimber products. His field sites include tropical forests in Sri Lanka and Panama, temperate forests in India and New England, and boreal forests in Saskatchewan, Canada.

Chapter 1

People, Forests, and Land Use: A History of Resource Exploitation, Conservation, and Sustainable Management

Mark Ashton

Morris K. Jessup Professor of Silviculture and Forest Ecology and

Director of School of Forests¹

Yale School of Forestry & Environmental Studies*

This chapter examines the history of forest management around the globe and the principles that will be critical to sustainable forest management for traditional and carbon crops in the future. Both sustainable and exploitative forestry practices have lessons to teach those managing forests for carbon. The author discusses how forest degradation in Europe led to the rise of scientific forestry, which then spread to one-time British colonies and the United States in the mid-19th and early 20th centuries. There is now a need to apply those same principles to forests in emerging markets in order to preserve and build fertility and maintain the economic viability of these forest agriculture systems. Management can shift towards sustainability if property rights and environmental laws can be enforced and a wide array of stable and diverse markets for multiple forest products, including ecosystem services such as water production and carbon sequestration, are present.

¹ For more information on the Yale School of Forestry & Environmental Studies, please go to www.environment.yale.edu

INTRODUCTION

This will be a very broad contextual discussion. I hope it will be a suitable introduction for this publication regarding the role that forests and unforested land play in addressing solutions to climate change. I will not be talking much about my

research, but will instead discuss my own philosophical perspectives on land use, forests, forestry, and the new paradigm of ecosystem services. Within this context, I will also discuss the phenomenon of carbon and whether it is, financially, something that can be garnered from forests.

Overall, this chapter seeks to contextualize some of the historical aspects of how land use has changed over time, how forests have changed over time, and how this might provide a perspective on where carbon finance and ecosystem services might go in the future. There is a very long history of forestland use, of which our interactions are just a very small fragment. I will provide a short summary of ancient forests and management practices, primarily indigenous management during the period before the capitalization of forests. Then I will talk about the Industrial Revolution and how forests and land were transformed during this time. After summarizing that land transformation, I will transition to a discussion of the nature of the various management paths that are currently being taken simultaneously in different parts of the world. I will take you through the process of exploitation, industrialization, degradation, rehabilitation, and then through the concept of sustainability. Finally, I will conclude with an emphasis on where we are potentially going with new ideas about sustainability, forest values, and, in particular, ecosystem services and carbon finance.

ANCIENT SILVICULTURAL SYSTEMS: FORESTS, SWIDDEN SYSTEMS AND AGRICULTURE

It is very important for us to recognize the fact that forests have been utilized by humans for long periods of time – three, four, five thousand years before the present – and in a readily sustainable way. See Figures 1 and 2 for examples of ancient silvicultural systems in the Yucatan and in South West England. When you are looking at ancient civilizations such as the Maya in Mexico and the Yucatan you observe land-use patterns that reflect the values and livelihoods of the human populations in those specific regions. Forests were managed in very sophisticated ways to sustain their livelihoods.

An example of one such sophisticated system is in northeast Sri Lanka, and is depicted in Figure 3. Sri Lanka is the teardrop-shaped island off the tip of South India, the Daikan. Sri Lankans' understanding of the utility of forests in managing water and agricultural crops across hilly terrain is evident in this picture. The temple forests in the foreground were set aside specifically to yield water. Perhaps this action was subconscious, or perhaps these were religious forests and people thought that protecting them would help them attain the heavens. There were often implicit linkages between what people did and their religion, and how land use was sustained for various compatible uses. They put dagoba, or temples, at the tops of these hills because they were closest to the heavens.

As we go down the slope we can begin to see swidden agriculture. A swidden system is a way of cultivating crops for a small window of time, and then relinquishing that land back to forest for a longer period in order for it to regain its

fertility. People practice this on the marginal upland areas associated with the landscape, which are just below the protected forest. Proceeding further downhill, we have settlements in the most ergonomically suitable areas, close to the paddy fields and irrigation systems. It was under circumstances like these that people learned to cultivate more fertile soils for mixed tree plantations, primarily for subsistence but over time also for cash crops.

Figure 1 Silvicultural system in the Yucatan



© Mark Ashton

Figure 2 Silvicultural system in South West England



© Mark Ashton

There is a whole area of land management one could define as “indigenous forest practices” that is now being recorded by anthropologists, social ecologists, economic botanists and silviculturalists. These practices hold many lessons on forestry and scientific methods of management that could be passed on to modern-day society, especially given the sets of values, markets, and land uses that we face today.

Such systems are very ancient and can be found across the world. They have not been systematically recorded, but they have been passed on through oral tradition, learned generation after generation. There is a whole area of land management one could define as “indigenous forest practices” that is now being recorded by anthropologists, social ecologists, economic botanists and silviculturalists. These practices hold many lessons on forestry and scientific methods of management that could be passed on to modern-day society, especially given the sets of values, markets, and land uses that we face today.

These systems eventually gave way to primarily agrarian systems across the whole of Western Europe. Agrarian systems still dominate the majority of land use in the world, particularly in developing nations. In the Himalayas and in southern India, much of the landscape is devoted to subsistence agrarian use. Trees provide the ultimate resource in terms of shelter, energy, and fertilizer for the sustainability of the society. The bulk of the population lives in this kind of environment, particularly throughout much of Africa, tropical Asia, and Latin America.

Figure 3 2000 year-old silvicultural system in northeast Sri Lanka



© Mark Ashton

As one can imagine, it is only when a resource becomes scarce that people think about management. So forestry as a profession – scientific forestry, really – arose in Central Europe during this transformation, this industrialization of the landscape.

THE INDUSTRIAL REVOLUTION AND THE RISE OF SCIENTIFIC FORESTRY

The Industrial Revolution in Central and Western Europe transformed agrarian communities into ones that relied upon money. This capitalization of economies caused people to be drawn off land and to instead generate income from goods and services that were being sold in cities. Natural resources like water and wood were nevertheless very important for these new economies, used in operations such as textile mills.

The Industrial Revolution started primarily in Europe, in Central Europe in particular, where forests were utilized as abundant natural capital. In Central and Western Europe, these natural assets were monetized to transform economies. The British Isles are another example, but the story is somewhat different. The British never really ran out of their own timber or forest resources; rather, they exploited other resources abroad.

As one can imagine, it is only when a resource becomes scarce that people think about management. So forestry as a profession - scientific forestry, really – arose in Central Europe during this transformation, this industrialization of the landscape. All those forests had been cut down for building construction and energy in the form of charcoal used to fuel the kilns, the steel production, the metallurgy that went on during this time.

Once these very valuable forest resources were lost, Europeans had to develop processes for planting the landscape back into trees. This need gave birth to scientific forestry in central Germany and the Czech Republic, where these resources were heavily depleted. Foresters started working primarily for the landed gentry – barons,

in religious lands that had been excessively depleted and cut over – to try and learn how to replant trees. How does one plant on landscapes that have been depauperated, or lost their topsoil? It is actually a very difficult thing to do.

Dengler (whose grave is in Tarrant in Saxony), Cronin, Koenig – these were the people who started to plant experimentally on wide, large swaths of denuded lands in Central Europe. This practice was quickly taken up in other regions. The British didn't have much forest to exploit of their own, so they exploited those in their colonies, particularly in South Asia. When we look at the birth of modern scientific forestry from Central Europe, you can actually see the connections from region to region that emanated from the education and learning experiences the entire region went through.

Sir Dietrich Brandis was a German who learned the new discipline of forestry under Dengler and colleagues at Tarrant, where the first forestry school was founded. It wasn't surprising when he was hired by the British government to start the Indian Forest Service in 1850 and to try to sustainably manage valuable forest resources. Much of those resources were cut over for the industrialization of British India. The railroad system, for example, was made out of teak. Brandis was brought on board by the British government to communicate and develop scientific forestry for the then-government of British India. It spread to countries like Sri Lanka, Malaysia, and other parts of the British Empire. He was also the founder of the Oxford Forestry Institute in 1900.

Figure 4 The Upper Peninsula in Michigan



Source: Lantern slides archived by Yale School of Forestry & Environmental Studies, from U.S. Forest Service photographs taken between 1900 and 1929.

economy in general, and particularly to the future livelihoods of rural people.¹

The British Forestry Commission, which is the equivalent of the U.S. Forest Service, did not really start until after World War I, when the British were completely depleted of their own resources. There are some very obvious pathways here in terms of scarcity and thinking about sustainability only after the exploitation of one's natural resources.

Brandis had a lot of very interesting, classical thoughts that we still use today. He introduced the importance of non-timber forest products, community forests, and water. While he was in India he was concerned with all of the important sources of value – or ecosystem services – we think forests provide today. Brandis wrote a nice summary of this in the *Empire Forestry Review* put out in 1896, in which he talks about fuelwood and energy, community forests, and non-timber forest products all being absolutely tied to the well-being of the

Before the Industrial Revolution we were largely an agrarian society but, as in Europe, people eventually moved away from farming and into cities. In so doing we exploited natural resources to create the charcoal that fueled the economy of a young, industrial North America, in particular the United States.

¹ Sir Dietrich Brandis, "Forestry in British India," in *Empire Forestry Review* (London: Empire Press, 1895).

We did not grow up in that environment in North America, but we did go through a wave of industrialization just a little bit behind Central Europe and the British Isles. We transformed our natural assets into mills, infrastructure, and cities. These resources capitalized our economy. Before the Industrial Revolution we were largely an agrarian society but, as in Europe, people eventually moved away from farming and into cities. In so doing we exploited natural resources to create the charcoal that fueled the economy of a young, industrial North America, in particular the United States. You might not see this transformation today, but in the Upper Peninsula of Michigan (Figure 4), in the Allegheny Plateau (Figure 5), or on the West Coast (Figure 6), timber resources were intensively and in many cases destructively harvested from the 1850s all the way up to the early 1900s.

Figure 5 The Allegheny Plateau in Pennsylvania



Source: Lantern slides archived by Yale School of Forestry & Environmental Studies, from U.S. Forest Service photographs taken between 1900 and 1929.

In fact, Yale University, with the founding of the Yale Forest School, had a lot to do with the formative, experiential training of the new science of forestry in this country. The first nine chiefs of the U.S. Forest Service came from the Yale Forest School.

It is therefore not surprising that the United States and Canada followed suit with scientific forestry. Americans and Canadians went to Central Europe, learned, and came back to practice here. In fact, Yale University, with the founding of the Yale Forest School, known today as the Yale School of Forestry & Environmental Studies had a lot to do with the formative, experiential training of the new science of forestry in this country. The first nine chiefs of the U.S. Forest Service came from the Yale Forest School.

Gifford Pinchot (Figure 7), a Yale College undergrad, went to Germany and learned about the new science of forestry. He brought its practices back to the United

States as a consulting forester for the Biltmore Estate in North Carolina. Pinchot founded the Yale Forest School, or at least helped co-found the Forest School, with his friend former Yale College undergraduate Henry Graves, who then went on to become the first Chief of the U.S. Forest Service.

Figure 6 The U.S. West Coast



Source: Lantern slides archived by Yale School of Forestry & Environmental Studies, from U.S. Forest Service photographs taken between 1900 and 1929.

Figure 7 Gifford Pinchot, co-founder of the Yale School of Forestry & Environmental Studies



Source: Lantern slides archived by Yale School of Forestry & Environmental Studies, from U.S. Forest Service photographs taken between 1900 and 1929.

This investment in education helps us understand the American desire to sustainably manage resources post industrialization. Early managers came to believe the country would experience a timber famine. They also began to ask themselves, “Where is the drinking water coming from?” Drinking water is a very important component of society, for both industrialization and sustenance. These were resource management needs that had to be addressed.

GLOBAL DISTRIBUTION AND EXPLOITATION OF FORESTS

I have elaborated on the early periods of forest exploitation emanating out of a Central European region that had rich forest resources and then completely depleted them. This practice goes on today; it hasn't really stopped. What we see today in

different regions is the same sort of exploitation that occurred in Central Europe and North America during the Industrial Revolution (see Figure 8). Much of this is occurring in regions related to colonial governments: Latin America, West Africa, and parts of Australasia and Southeast Asia. This forest exploitation is old news, at least from our perspective. It has gone on for more than a hundred years (see Figure 9).

Figure 8 Frontiers of modern-day forest exploitation



© Mark Ashton

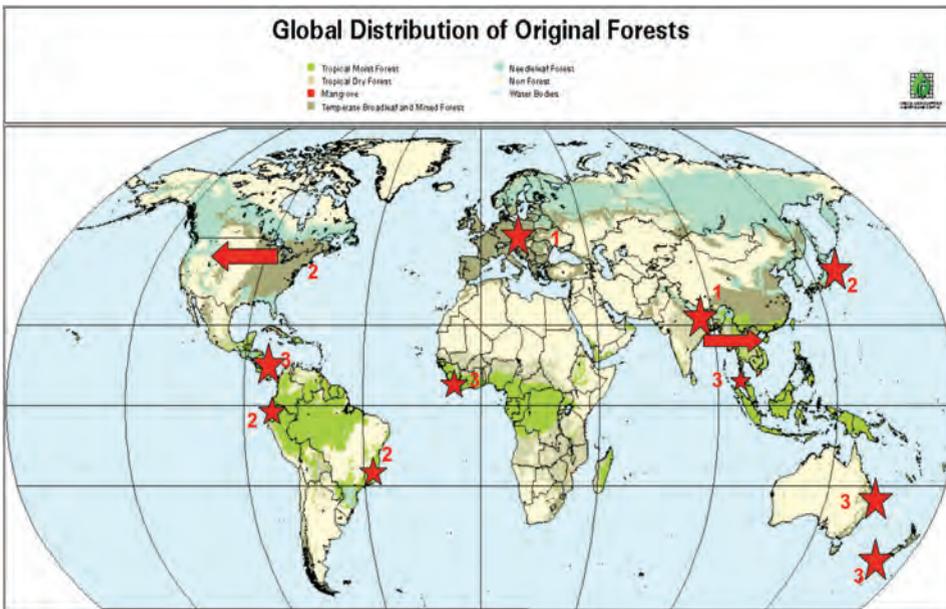
Many of these lands have not been allowed to go back to their original forest state after exploitation, but have instead been converted to new crops, cash crops like *Hevea brasiliensis* (rubber) and tea plantations that were established to feed the demand of Western European and North American urban dwellers. Much of the land that was exploited, particularly in the tropics but also in the West and in the temperate regions, has been converted to a more permanent industrial agriculture. Soybean and sugar cane are the predominant crops in parts of Latin America. Oil palm, rubber, coffee, and tea plantations have become part of the industrialization of West African and South and Southeast Asian forests.

In some cases, this form of plantation agriculture is sustainable. The rubber plantations that were introduced in the late 1800s in Sri Lanka and Malaysia are still in operation. Many of them have switched crops to adjust to current commodity valuations; this means a move to palm oil. But these plantations are still being sustained. This is also the case with industrial agriculture here in North America, which is being maintained primarily through application of *ex situ* fertilizers.

Now we face the industrialization of fuelwood crops. Wood has always been used as a fuel source; it is probably still the most important energy source for the majority

of people in the world. It is now being re-ignited as a potential fuel for our modern-day, industrialized society. For example, there is currently a big conflict between using industrial sugar plantations for food crops and using them for energy. One can see this being played out right now in Latin America and here in the United States with corn and ethanol.

Figure 9 Zones of forest exploitation (1800-1960)



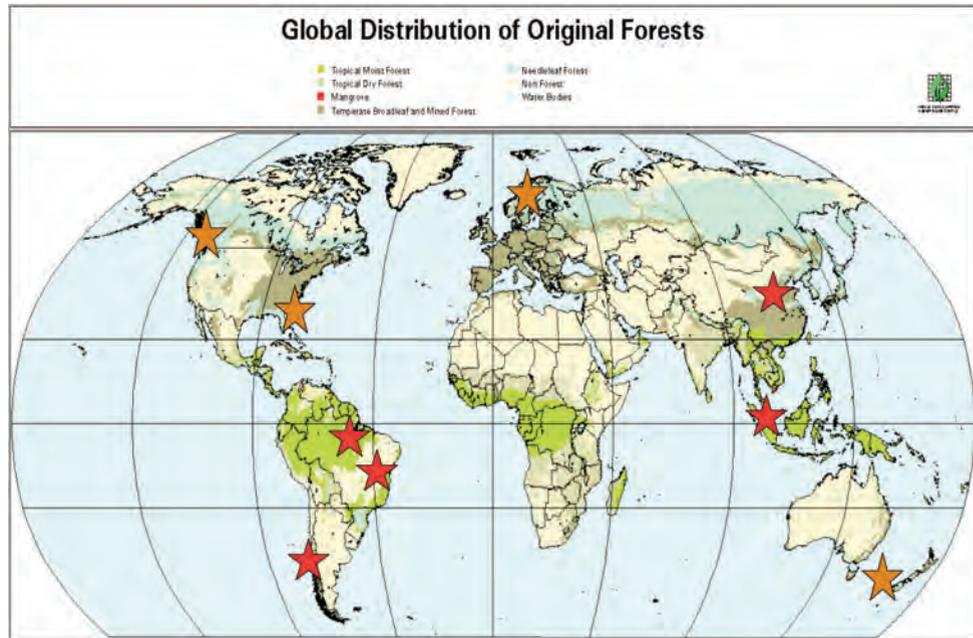
Analysis by Mark Ashton, overlying map taken from Manuel Alonso, "Community Forestry Guide to Global Issues and European Certified Timber Markets" (Puerto Jimenez: Fundacion TUVa, 1998). Underlying map data from UNEP-WCMC (United Nations Environment Programme-World Conservation Monitoring Centre).

The large industrial wood plantations have been primarily in western and southeastern North America for the past 50-odd years. The wood basket of the United States is still the Southeast. Scandinavia has also played a very important role in the industrialization process of using wood as a product and as an energy source (see Figure 10). Australasia, particularly New Zealand and parts of Southwest Australia, have also developed plantations for wood and fiber for industrial needs in the last 20 to 30 years. Plantations have also seen great expansion into China and parts of Latin America. Their spread correlates to the same kind of industrialization for cash crops explained above.

People who join this industrialization process today often have to learn the hard way. Money tends to drive values and to push investments toward the marketing of those kinds of raw materials that are intensively managed – for example wood, sugar cane or soybeans. This is particularly true on landscapes that are not suited to industrialization or capitalization. Industrial croppers have not learned, or have been disconnected from historical management practices. Many of these croppers are

colonists; many financiers are new investors. They are often distant from the learning experiences of local, indigenous silvicultural systems. It is a new learning experience, and it is often by mistakes that they learn instead of benefiting from long-tested local practices.

Figure 10 Current zones of industrialization



Analysis by Mark Ashton, overlying map taken from Manuel Alonso, "Community Forestry Guide to Global Issues and European Certified Timber Markets" (Puerto Jimenez: Fundacion TUVA, 1998). Underlying map data from UNEP-WCMC (United Nations Environment Program-World Conservation Monitoring Centre).

Vast areas of this industrialized landscape have become vacant, abandoned, degraded – truly degraded. The process of converting tropical rainforests to industrial crops has often been assumed to be totally degrading. In fact, the soils are still fertile, and many of the species that were originally cut, like mahogany, are probably still there. But they are in a state of regeneration, not in the form of a mature market commodity that one can cut now. As a result, with time always of the essence, if people can plant another commodity crop that can be intensively managed, they convert.

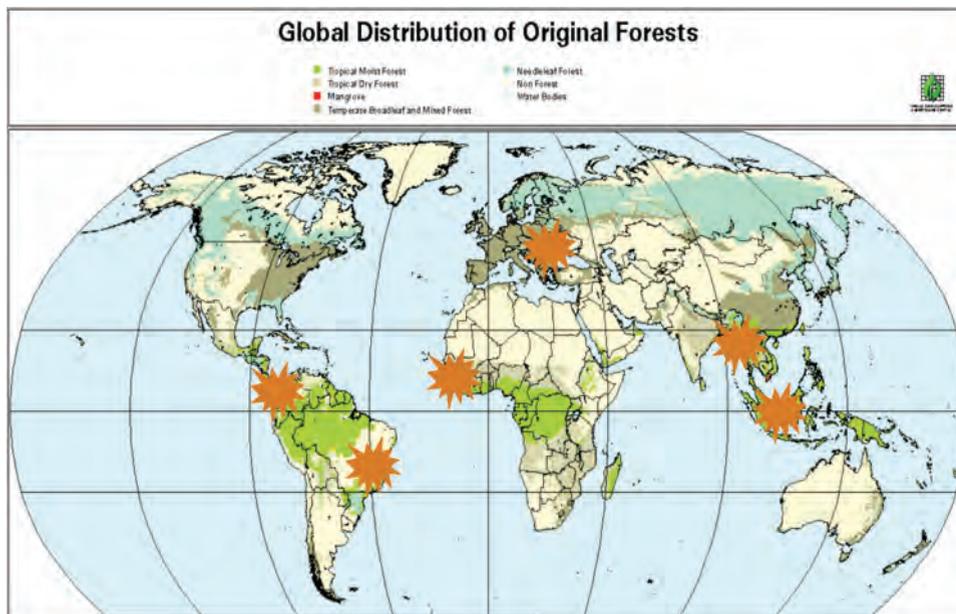
It is under these circumstances that much of the landscape has lost its fertility. We are now looking at the spread of invasive grasses, like the South Asian *Saccharum spontaneum* in Panama. This has gone on the world over. Much of the landscape has gone through this intensification process, and then been relinquished. Figure 11 depicts a rubber plantation in Sarawak in Borneo. This crop is completely incompatible with the landscape. It is going to be abandoned. You can clearly look at the landscape and see that there is no topsoil, and as with many of the tropical regions, the fertility of the soil is in the first few centimeters. If you lose it, you're done.

Figure 11 Degradation from industrialized plantations: rubber plantation in Borneo



© Mark Ashton

Figure 12 Current zones of degradation



Analysis by Mark Ashton, overlying map taken from Manuel Alonso, "Community Forestry Guide to Global Issues and European Certified Timber Markets" (Puerto Jimenez: Fundacion TUVA, 1998). Underlying map data from UNEP-WCMC (United Nations Environment Programme-World Conservation Monitoring Centre).

The industrialization transformation has left regions in states of serious degradation. Current realms of use continue to host industrialization on lands that really should never

have been converted (see Figure 12). For example, in the Atlantic rainforests of Brazil and much of Central America, forests that had been cleared a very long time ago have been moved primarily to either sugar cane or cattle ranching. In many areas, this cannot be sustained. These lands are now in a process of potential rehabilitation. The same areas of West Africa that were exploited in the late 1800s and early 1900s, however, are seeing ongoing degradation, particularly by industrial cacao and palm oil plantations. Much of Asia and Eastern Europe are also experiencing dramatic degradation.

There is a new phase of exploitation occurring in the world today. When I say “new,” I mean that people have been doing this for a long period of time but in a less sophisticated manner than we are today. When you think about it, the way people rehabilitated landscapes in Central Europe was to plant, wait, harvest, let the soil build, and then plant again. This is how forestry got its start. It still follows these planting practices while grappling with sustainability and degradation, but people have become much more sophisticated in order to generate multiple values and services.

CREATING MULTIPLE VALUE STREAMS – ECOSYSTEM SERVICES AND CARBON FINANCE

Several silviculturalists from the Smithsonian and Sri Lanka, including myself, are undertaking plantation trials in Panama to investigate mixed species plantings and multiple crop values (see Figure 13). As we know, multiple crop values can mature at different points in a forest’s development, making them much more compatible with risk-averse investment strategies that provide near-term returns to investors. This is particularly true when working on landscapes that are marginal and almost constantly fertile. These types of landscapes are extensive throughout the world. They relate to ecosystem services, and I believe they can be related to carbon finance as a component of ecosystem services as well.

If we do not actually, physically, manage natural resources, then nature will do it for us (see Figure 14). When you think about second-growth, post-agriculture forest here in the Northeast, the majority is second-growth that originated through natural means. Yes, we planted, but the majority of existing Northeastern forests were established by old-field pines, which served as the only viable seed source on abandoned farmlands. These pines sent out seeds that germinated, grew, and then relinquished their growing space to new trees, new species that came up underneath, like second-growth hardwoods. The entire landscape of New England is a rehabilitated forest, a second-growth forest about a hundred years old that was established as people moved off the land during industrialization. This is happening right now throughout Central America and in parts of South and Southeast Asia. Figure 14 is an example of second-growth forest in the Himalayas. The ancient agricultural terraces are still somewhat visible, although they were naturally reforested through oak regeneration.

Figure 13 Rehabilitation of native tree species on cleared forest lands in Panama



© Mark Ashton

Figure 14 Second growth forests on abandoned agricultural lands



© Mark Ashton

FORESTS ARE A VALUABLE RESOURCE – A FINANCIAL ANALYSIS

A more passive approach to forestry – initiating certain silvicultural practices and implementing more sophisticated plantings that release secondary succession – will allow those forests to play a very important role.

We are doing work in Sri Lanka looking at tea as a commodity competing economically with forests. In those circumstances, when tea is viewed as an industrialized crop, it is very valuable. Investment in tea crops is driven by the market value of tea; thus when tea is highly valued in the market, non-market forest values will be sacrificed to increase tea production. Such practices are unsustainable. You can utilize the land for about thirty years and then you have to abandon it as the topsoil will be worn out.

One can compare the value of monoculture tea crops with the values of other products that can be sequentially managed in combination with forestland. These other products are various kinds of non-timber-forest products – like cane, which is rattan for those of you who have rattan furniture; cardamom, a spice; and sugar palm. Each of these crops can be generated in the understory of a forest to provide a sequential form of crop management.

In addition to these understory crops, there are highly valuable timber trees that can be managed over long rotation periods for eventual harvest. You do not see these grown in today's intensively managed plantation systems. Instead, the plantations you see today are for construction materials – volume, not quality. But there will always be a market for quality. You cannot grow quality in single plantations because the rotations are too long to wait for your investment return. But if you sequentially manage over time for a number of values compatible with the length of that rotation, then you could actually gain a much greater net present value. This is particularly true when you start thinking about the new ideas about climate amelioration and the roles played by forests locally, regionally, and globally.

For example, water is a valuable “crop” that can provide downstream benefits and services for agriculture and irrigation, as well as drinking water. Forests supply drinking water to many cities, particularly on the east coast of the United States. All of the big cities on the east coast -- Boston, New York, New Haven -- use drinking water supplied from forested watersheds. In the city of New Haven, the Southern Connecticut Water Authority owns and manages 26,000 acres of forest land for drinking water for New Haven and all of the surrounding towns. Forests are an extraordinarily important and valuable resource in this regard.

The plantations you see today are for construction materials – volume, not quality. But if you sequentially manage over time for a number of values, you could actually gain a much greater net present value. This is particularly true when you start thinking about the new ideas about climate amelioration and the roles played by forests locally, regionally and globally.

FOREST TRANSFORMATION TRENDS

The land transformation trends I have been discussing are cyclical due to the dynamic nature of the world we live in. Around the globe, processes of exploitation are going on, while in other places the practice of sustainability is being pursued. The processes of resource depletion and land rehabilitation are continuous.

The plantations you see today are for construction materials – volume, not quality. But if you sequentially manage over time for a number of values, you could actually gain a much greater net present value. This is particularly true when you start thinking about the new ideas about climate amelioration and the roles played by forests locally, regionally and globally.

The industrialization processes that many countries like Brazil, Indonesia, and China are now experiencing are echoes of what Europe and eastern North America went through a long time ago. Viewing natural resources as globally marketable assets makes management very difficult, because at one end of the globe these forests are being exploited, and at the other they are being sustainably managed. Many regions of the world that have already gone through this industrialization process are now working towards sustainably managing forests for society. Sustainably managed forest resources are in direct competition with exploited forest resources in the global markets.

Natural resource management is extraordinarily complex because of the different kinds of market values, agrarian values, and resource values that society faces today. With a few exceptions, these are the processes that most countries are going through or have gone through everywhere in the world.

ECOSYSTEM SERVICES AND FORESTS – A COMPLEX ISSUE WITH VARYING SOLUTIONS

It is my hope that this discussion of forest management issues around the world establishes a context in which to discuss the role that managed forests might play in the carbon cycle. Clearly, management is complicated; there are many competing values. There are many transformative boundaries, issues, and resources around the world that countries are dealing with at different times and there are still many countries that are agrarian and not industrialized.

How do we look towards the future? How do we include carbon finance and ecosystem services within this kind of complicated framework? There are a number of potential causes of forest degradation that must be remedied in conjunction with implementing management practices aimed at carbon sequestration.

Population growth and poverty are obvious factors. Many people allude to population growth as one of the driving causes of deforestation. There is always potential for population growth to be detrimental to forests, but in many circumstances population growth is not related to deforestation; there are other, underlying processes to blame. Poverty is another factor to think about. Increasing settlement pressures from marginalized sectors of the population, often the poor, can put stress on natural systems. How is one going to deal with this when trying to think about ecosystem services? How do you incorporate the poor into these capitalized economies that ecosystem service values are swirling around in?

Speculation is another potentially degrading factor to consider. Land speculation by wealthy investors makes the practice of protecting forests, utilizing forests sustainably, very difficult. Investor speculation in forests must be balanced with regulation, law, and land ownership. Many countries have property rights laws on the books that are either very weak or simply not practiced. There are contradictory laws, and perverse laws that promote largely unsustainable outcomes. Perverse tax incentives are one example. There are many countries with different cultures that promote poor land use laws and regulations even though in the long run they are incompatible with the landscape and the nature of what the land can provide.

Mono-dominant crop systems, particularly on marginal lands where one is trying to cultivate a landscape that is relatively infertile and steep, tends to be risky in the long run. Mono-dominant values are unsustainable in many of these circumstances. One can sustain monocultures on more fertile areas, however. Where nature's capital – the soil, the soil fertility, its ability to control and utilize water and nutrients – is deep, rotations can be quick. In these circumstances landscapes can be mono-dominant. Monoculture irrigated agriculture, for example, has been practiced for thousands of years in the Euphrates, in the Indus. Wheat and paddy cultivation there are very appropriate. In other words, there is no “either/or” here; the management decisions must be contextualized.

In addition, often when you are looking at the liberalization of markets there are adjustment policies needed to realize the actual, true value of natural resources. This can be the case where resources are either subsidized or undervalued by the market. Of course, there is much to talk about in terms of the abuses of power by the state and its many actors regarding property rights, planning, administration and control.

These are all problems, but there are some solutions. No one fix is preferred over the others; they all have to work together within the complexities of the circumstances in which they operate. One of the critical solutions is security in land tenure, or property rights. Land ownership, whether by a community, an individual, or a state, must be well recognized culturally by the citizens of that country, by the citizens of that state, and by the local community. In most circumstances this is the key to improved land management. There has to be a conducive social setting in place before we can get into anything that relates to the silviculture, to the biological management of sustainability. The social setting has to be right.

Once that it established, the existence of a wide array of stable and diverse markets allows managers to work with a wide array of values, thus reducing the risk that any single commodity price will erase profitability. My predecessor in silviculture here at this school said, “Y’ know, Mark, social values change much more rapidly than trees and forests grow.” That is very important to keep in mind. A market value could be here today and gone tomorrow. We sustainably manage our resource at Yale’s School Forests and market various kinds of wood products. The nature of the value of the wood changes year-to-year depending upon the species, which depends upon the actual changes in market and changes in import and export due to the globalization of trade – which can happen overnight.

Having a diverse array of both goods and services to play with in forests is very important. I say services because services are a new thing. We recognize water, but we have not fully recognized its value. And we are only just beginning to recognize the value of forests in terms of climate amelioration, moderation, urban environments, suburban environments, and so on. People are beginning to think about putting values on these services, like carbon prices, but it is very difficult. Is this valuation of ecosystem services something that can be done?

Tax incentives are another tool. It is always useful to have taxes; if the state believes forests are valuable then they should be taxed at a rate that encourages sustainable management. If policymakers do not want development in a forest, if they do not

Having a diverse array of both goods and services to play with within forests is very important...People are beginning to think about putting values on these services, like carbon prices, but it is very difficult. Is this valuation of ecosystem services something that can be done?

want buildings on forested land or on top of the drinking water supply, then they should tax these lands at the value of the forest, not at the value of a potential development. Land-use planning is another solution, albeit more complex, that is still coming into effect in this country. Land-use planning is a very important component of trying to identify where and how the state is going to sustain the various values society wants in the long term.

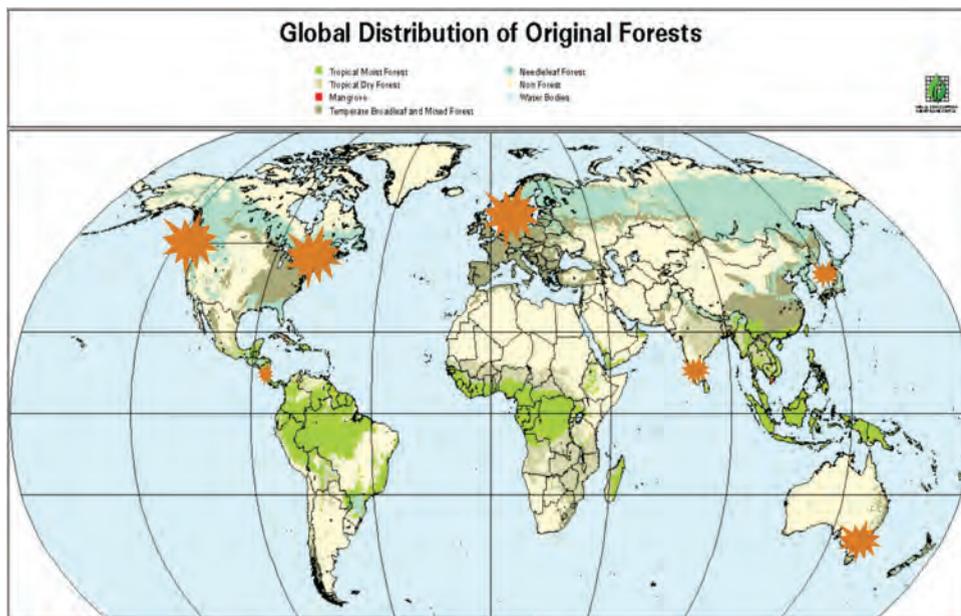
Having a diverse array of both goods and services to play with within forests is very important... People are beginning to think about putting values on these services, like carbon prices, but it is very difficult. Is this valuation of ecosystem services something that can be done?

Strong environmental regulations that are evenly enforced are also important. I am always a keen proponent of balanced ownership: private and public, community, local and state. If there is a balance of ownerships, then there will also be a balanced portfolio in terms of the suite of values that dictate how management is going to occur.

REGIONS PRACTICING SUSTAINABLE FORESTRY AND EXPLOITATION

So where do I think the sustainable forestry is currently being practiced? In fact I think forests are being sustainably managed in the same zones that gave birth to the industrialization process and the wave, in my opinion, of land transformation and exploitation (see Figure 15).

Figure 15 Forest regions of the world that are practicing sustainability

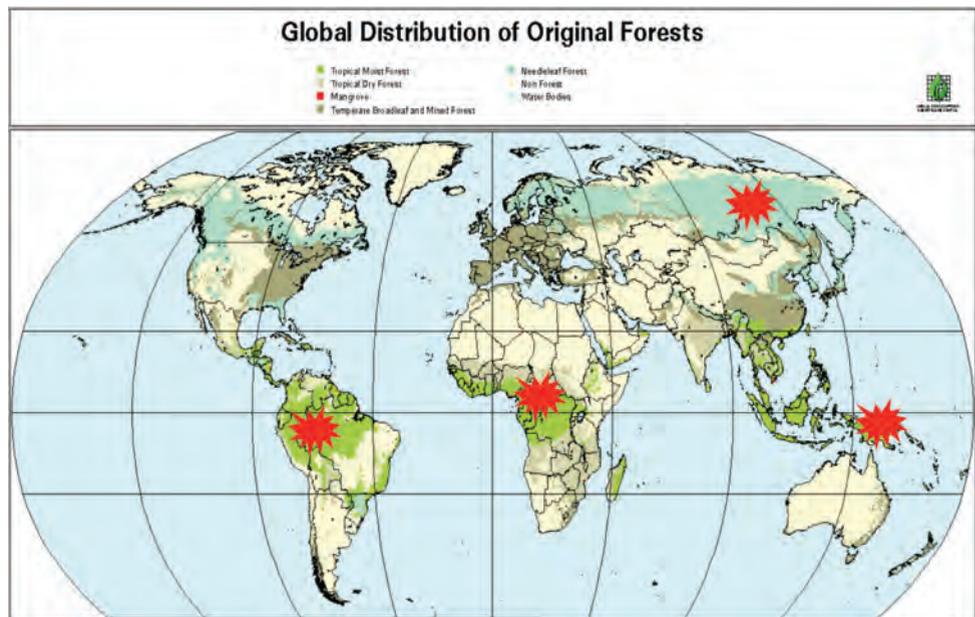


Analysis by Mark Ashton, overlying map taken from Manuel Alonso, "Community Forestry Guide to Global Issues and European Certified Timber Markets" (Puerto Jimenez: Fundacion TUVA, 1998). Underlying map data from UNEP-WCMC (United Nations Environment Program-World Conservation Monitoring Centre).

These are zones in which the land and capital markets have matured. Sustainable forestry is being practiced in parts of Europe, North America, Australasia and South and Northeast Asia. This is not to say that there are not other places practicing sustainable forestry, of course there are, but these tend to be the key areas. In addition, Central America, primarily in places like Costa Rica, has pioneered tropical forest values, particularly with regard to ecosystem service values.

On the other end of the spectrum, where are the big zones of exploitation? The margins of the Brazilian Amazon are undergoing huge land transformations (see Figure 16). This region is very unstable in terms of property rights and land tenure. There is a great deal of resource exploitation and instability in Central Africa due to property rights disputes between the states and local tribal peoples. New Guinea, Asia, and parts of Indonesia are immensely unstable right now. I would also argue that parts of Siberia are fairly unstable in terms of management and exploitation.

Figure 16 Forest regions of the world that are experiencing resource exploitation



Analysis by Mark Ashton, overlying map taken from Manuel Alonso, "Community Forestry Guide to Global Issues and European Certified Timber Markets" (Puerto Jimenez: Fundacion TUVA, 1998). Underlying map data from UNEP-WCMC (United Nations Environment Program-World Conservation Monitoring Centre).

TODAY'S RESOURCE ISSUES

There are a number of critical global resource issues today. Tropical forest degradation is a big one, particularly in terms of ideas about rehabilitation and conservation values that relate to biodiversity. Community rehabilitation is another, as this relates to social forestry. The question often arises of how one can actually develop sustainable local communities and provide ways the rural poor can lift

themselves out of poverty. This question must be considered when devising management plans in transitional regions. We have already talked about climate amelioration and ecosystem services and will be talking a lot more about the concepts of carbon finance, forests and land use throughout this publication. One cannot help but look at these issues and think about all of the overlapping and potentially conflicting issues I have discussed.

Forests provide energy in the form of fuel wood, which is itself a source of carbon. Is this a good or a bad thing? Is this energy something that will be utilized for community development? Is it going to have detrimental effects on the wealth of biodiversity that is housed in tropical forests? I do not know the answers. Again, these are all conflicting values, and they are enormous issues.

Forests also provide water and water storage. Water will always be a very important consideration when managing forests, given the fact that most of the world's population lives outside of forests, yet most of their drinking and irrigation water is produced and stored in forest landscapes.

In terms of smallholder management, all kinds of issues occur in terms of private forestland management and individual forestland management. These include economies of scale – both economic and biophysical constraints; access to markets; and access to expertise and knowledge.

And of course, there is the recognition of the important role forests play in urban environments, particularly in community rehabilitation, community development, and bringing some of the rural community techniques back into urban environments. My colleague Professor Bill Burch pioneered this concept here at Yale's Urban Resources Initiative with the help of colleagues at the Forest Service. The Urban Resources Initiative has been involved in learning from rural and agrarian environments and rural poverty, and transforming what forests can do in similar situations in an urban setting.

THE ROLE OF CARBON AS AN ECOSYSTEM SERVICE

So where do we go from here? How are we going to look at carbon within this context? The first thing I will say is that it is very complicated and there will not be any simple answers. There is a lot of scientific research being done now that is beginning to suggest that forests play a major role in ameliorating local, regional, and global climates. How do we value that in our capital markets? How does forest carbon become a commodity to be traded within markets to advance solutions to climate change? Can it work? If so, how? There are a lot of complexities involved in answering these questions, particularly in terms of business and around how these values conflict or complement the other resource issues that face forests. How can we make incentives, laws, policies and regulations work collectively or independently so that markets work to advance sustainable forest management and climate amelioration? I think this publication will suggest many answers to those questions, but I also think this discussion will generate many more questions.

How does forest carbon become a commodity to be traded within markets to advance solutions to climate change? Can it work? If so, how? There are a lot of complexities involved in answering these questions, particularly in terms of business and around how these values conflict or complement the other resource issues that face forests.

Question & Answer Session

QUESTION 1: Investing in biodiversity

I know you have looked at the net present value of a tea plantation versus second growth forests, and you compared a number of different product and ecosystem service value streams at a discount rate of 4%. I understand that farmers working in an area where they have an inflation rate of maybe 10-100% in their country are not going to be able to do that, but why don't we see the international investment firms looking at investments in this way? They're still planting African palm and investing in mono-dominant banana plantations or widespread plantations that don't take into account the biodiversity aspects of a project that you have laid out here. Why aren't they considering biodiversity as an option?

The state, however, should be trying to gauge the consequences of those short-term investments for water quality, climate change, biodiversity and conservation, particularly if the landscape has been depleted. This is not included in the mono-dominant economic analysis.

There are a number of reasons for that. It is related to what you could do on the land in relation to the set of laws and regulations that are set by the state locally, regionally, or within the country itself. So number one is, you're allowed to do what the state tells you that you can do. As an individual investor, if you are looking at the income generated from those kinds of markets you can do it in the short term for one crop. It thus makes absolute economic sense if you just look at that piece of land for one purpose, like palm production for oil palm.

The state, however, should be trying to gauge the consequences of those short-term investments for water quality, climate change, biodiversity and conservation, particularly if the landscape has been depleted. This is not included in the mono-dominant economic analysis. The long-term societal costs of exploitation should probably be outside of the direct market analysis, but the state should consider them in regulation and resource planning and, in some cases, impose appropriate costs on private investors.

I am not blaming the states, by the way, because in many circumstances they have to address a lot of sophisticated planning, conflict resolution, and property rights issues. In those circumstances it is very easy for large landowners to capitalize on small landowners, and you see it all the time. Through that wave of transformation, many smallholders might be the first to clear land, to try and manage the land, but the government provides them an inadequately large or an infertile piece of land. Under those circumstances smallholders cannot sustain the livelihoods they want, and so they sell to a much larger landowner who has more extensive holdings. That is very much the case in Latin America.

QUESTION 2: The role of the state in creating value for ecosystem services

How long do you think it will take before there is a monetary incentive to leave forests in their natural form? When do you think the markets will be able to actually value all of those intangible ecosystem services that you spoke about rather than just the timber, fuel or cultivated outputs? Do you feel that the state will have to have a stronger role in making this happen?

Yes, the state has to have a stronger, more sophisticated role. The sustainability of any forest is really dependent upon the social context in which you can practice forest management, whether it be for various kinds of ecosystem services, products, goods or services.

Within that landscape, within that series of regulation zones, you as a private investor can make a decision – which might be a little less risky with clearer laws and planning from the state – resulting in a slightly lower interest rate and return. In many ways markets are all about risk. If you have a less risky legal structure and more stable environment in which to practice, then investors are likely to provide more investment for a longer period of time.

The sophistication of government management is also important. You are asking me a question that is difficult for me to answer because I am a silviculturist, an applied ecologist, not a social scientist. My feeling is that you have to have the social circumstance first, but as you start to actively manage the forest technology plays a big role. When I say “technology,” I mean the knowledge and practices that allow one to integrate mixtures together, to increase growth rates. That is silviculture. I think society has a long way to go in developing sophisticated systems and technologies from silviculture. They are there, but it takes time to recognize the nature of stacking and compatibility.

In modern-day land use it tends to be an either/or situation, and it need not be. Management should be contextualized depending upon where you are and what circumstance you are facing in terms of the biological setting. This will dictate whether you can or cannot reforest or protect, actively manage or take a more passive management role. It is not a question of one-size-fits-all, and too many unfortunate environmental regulatory schemes are primitive and tend to use a cookie-cutter approach, generalized across wide regions, and do not really take into account the nature of the actual circumstances at hand. One day I hope we will be a little bit more sophisticated about planning, laws, policies, and values.

QUESTION 3: Balancing land ownership in China

I am from China where all of the land is basically owned by the government. The issue of balanced land ownership between public and private players in a non-industrial and industrial setting is very interesting to me. How do you define a balanced land ownership portfolio and how does that affect sustainable forest management?

My own belief is that it is in China’s long-term interest to have a variety of land ownerships. I believe China has indigenous community forestlands and cooperatives, so there is actually diversity within China’s existing land ownership regime. However, China could also increase its diversity through privatization in certain circumstances, which isn’t always ideal, but there is some good there. When people own land, given a set of stable regulations, they will likely reinvest in that forestland continuously and take pride in it. This is true for small farmers and landowners just as much as it is for large landowners.

Diversity of ownership also provides other sets of social values across a landscape that is continuously changing. In my opinion as an ecologist, taking a wide, diverse land ownership regime builds greater redundancy and resilience within your system. It builds resilience within your market system, your social system, and your ecological system. People manage things differently, and if one landowner decides to do something and makes a big mistake, the landowner values are still there. Of course private landowners can sometimes act like lemmings, which complicates privatization, but the state tends to be a more moderating influence.

QUESTION 4: Scalability of community forestry

Do you think that indigenous silvicultural systems are scalable?

Yes, I do, but only in the right context. Location matters. On primarily marginal lands where you are looking at trying to diversify your assets, your values cater to markets that are always going to change. So the sophistication of how you manage across that landscape matters. What you do on ridges versus valleys is going to be different. So the landowner might scale up, but you are still managing small in many ways.

QUESTION 5: Reducing the risk of long-term investments

I wanted to build on the first question. I know in comparing a rainforest with a tea plantation, for instance, investors sometimes use a low discount rate which makes sense for longer-term investments. However, I think one factor that might push that discount rate up is unstable currency and inflation, and investors will want to be compensated for taking that risk. There are two sets of risks, financial risks in terms of country risk and the risk that there is not going to be a market for some of these more esoteric products, and silviculture risks. From a silvicultural perspective, how do you think investors could reduce their risk in terms of taking those longer-term investments over shorter-term investment options?

I think it is through scarcity. People will always want high-quality timber for their exquisite furniture and houses. Scarcity drives up those values, and many of those particular values I showed you can only be grown in mixture, not in single species, because they are largely what is defined in ecology as “density-dependent.” They are always susceptible to pathogens. Since they have largely been exploited from the forest they are now rare and command a much higher value. People are beginning to cultivate them, but the only way to cultivate them is in mixture. That’s the silvicultural component.

QUESTION 6: Natural disasters and forest management

How are the issues of wildfires, landslides, and other natural disasters addressed in forest management by investors? Investors are concerned about these things, especially as they apply to permanence and carbon markets.

Depending upon the nature of the likely disturbance, there is always risk. No doubt about it, there is risk in terms of climate disturbance and carbon. The scale and impact, however, really depend upon the region that you are in. Market analysts and investors are therefore looking not only at the risks in terms of social circumstances, but also the risks in terms of biological circumstances.

QUESTION 7: The value of water as an ecosystem service for private landholders

You provided several good examples of public entities or quasi-private-public entities that have received monetary benefit from water quality coming out of forests, the New Haven Water Authority being a good example. Are there any examples where private landholders have been compensated for water quality coming off of their lands?

Yes, private landowners are beginning to get compensated through various kinds of programs so long as downstream water users are willing to pay. There is an incentive structure in place in the Catskills, financed by New York City. This is also happening to a certain extent for example in Quito, Ecuador. These mechanisms are still somewhat novel, but they are emerging and it is happening.

QUESTION 8: Sustainable forest management in New England

In Figure 15, you showed a star up in the northeastern United States, perhaps New England. What's happening with regards to sustainable forest management in this region and what is driving it?

I think New England is an interesting case. Like the West Coast, the country as a whole is gravitating toward better, more refined environmental regulations and protected area strategies, and is moving toward land-use zoning. This is being done on both coasts. The technology, the science behind sustainability and management, is also well known and really grounded and developed in this region. Also look at the land ownership patterns, particularly in New England. They are actually fairly diverse, with a range of both large and small landowners. There is a social setting that makes New England, relative to the rest of the world, something unique and something to think about. Having said that, there are a lot of faults too. For example, land use planning and zoning regulations are still weak; tax incentives and monetary programs to create and maintain strong local forest product markets are basic and need improvement; and there is still a long way to go in the development of ecosystem service markets, particularly in terms of assigning values for things like drinking water, but also in making payments for private land access for public recreation.

Protecting Forests and Lands through Environmental Markets and Finance

Mark Tercek

*President and CEO
The Nature Conservancy*



February 10, 2009
5:30 to 7:00 p.m.
Burke Auditorium, Kroon Hall
195 Prospect Street

Mark Tercek joined The Nature Conservancy in July 2008. He combines global business experience, experience working effectively in different cultures and recognized leadership on climate change and other environmental issues. In his prior position as a managing director at Goldman Sachs, Mr. Tercek headed the firm's Center for Environmental Markets and its Environmental Strategy Group and played a major role in designing and implementing the firm's environmental strategy.

Mr. Tercek collaborates with Resources for the Future, the World Resources Institute and the Woods Hole Research Center on projects concerning climate change. He serves on the Council on Foreign Relations' independent task force on climate change, the Wildlife Conservation Society's Chilean Advisory Council, and the Steering Group of the Prince of Wales' Rainforest Project.

Mr. Tercek's numerous leadership roles include serving as the founding board member of Seachange Capital (a start-up investment bank-like intermediary serving the not-for-profit sector), the immediate past chairman of the board of trustees for Literacy Partners, and a trustee of Business for Social Responsibility. Mr. Tercek is an adjunct professor at New York University's Stern School of Business. He earned an M.B.A. with distinction from the Harvard Business School and a B.A. with honors from Williams College.

Chapter 2

Protecting Forests and Lands through Environmental Markets and Finance

Mark Tercek
President and CEO
The Nature Conservancy*

This chapter examines opportunities and challenges for establishment of a meaningful forest carbon market from the perspective of a global conservation organization dedicated to increasing acreage and improving management of protected lands. The Nature Conservancy has been active in developing forest carbon projects since the early 1990s, all with an eye to balancing ecological, economic, and social concerns. The author candidly discusses several reasons why forest carbon markets have not, to date, lived up to their potential to generate significant volumes of offset credits as well as the factors that have changed over the past decade that will enable the market. He describes a model Reducing Emissions from Deforestation and Degradation (REDD) project in Bolivia and some of the lessons learned for future avoided deforestation projects. Finally, the author highlights the need for the United States to establish a commitment to reducing greenhouse gas emissions to drive the market for forest carbon and the need for the forest carbon community to ensure that projects will meet the highest standards for accounting and environmental credibility.

* For more information on The Nature Conservancy, please go to www.nature.org

INTRODUCTION

The Nature Conservancy's mission is to protect the diversity of life on Earth. We do that by protecting the land and water that plants, animals, and people need to survive and thrive. We are the world's largest conservation organization. We work in all 50 U.S. states and in more than 30 countries, mostly in Latin America, the Caribbean, Australia, and Asia. We have nearly 4,000 staff, including 500 scientists. But we started small.

The Conservancy was founded by a few scientists who could not stand to see the last remaining woodlands in New York State cleared. They decided they would have to buy some of them to protect them. The first parcel was purchased in 1955 – it was 60 acres of woodland along the Mianus River Gorge on the New York – Connecticut border. I just visited there, and it retains every bit of the beauty that originally brought us there. It continues to draw people from all around the area and from all walks of life, a testament to people’s enduring connection to nature.

From that beginning, over the last 58 years the Conservancy has protected more than 119 million acres of land and over 5,000 miles of rivers worldwide. Some of you are no doubt thinking that 119 million acres is peanuts in the grand scheme of what is needed for conservation. In the Conservancy’s view, as well, that is nowhere near enough land or water to maintain biodiversity. And there probably never will be enough in pure reserves. So clearly, a critical part of our job is to learn how to mix nature, people, and economic activity.

We need to think about how places are used, how they are valued, and how they relate to the people that live and work in them. And, to be practical, we need to think about how to move beyond charity and government grants to get really meaningful funds flowing into conservation. This means using new market mechanisms and financial mechanisms.

We have to think about new ways to protect land and seascapes. We have to think about how places are used, how they are valued, and how they relate to the people that live and work in them. And, to be practical, we need to think about how to move beyond charity and government grants to get really meaningful funds flowing into conservation. This means using new market mechanisms and financial mechanisms.

One example is our recent work off the California coast, where we are bringing our experience with conservation of working lands to the conservation of the sea. Along California’s central coast, traditional trawl fishing does great damage through high bycatch rates and seafloor degradation. This not only threatens the biodiversity of the region, but also the economic viability of local fishing communities. So in 2006, we led a collaboration with fishermen and fishery managers that established large trawl fishing closures that will protect 3.8 million acres of seafloor off the central coast.

Cooperation was critical. Local fishermen and harbor masters worked with us to map the no-trawl zone. To ease the transition to more sustainable forms of fishing, the Conservancy bought some fishing permits and vessels and then leased them back to fishermen. This collaboration is ongoing. We are now working with those fishermen to use more environmentally and economically sustainable gear and methods. Our goal is to increase both conservation benefits and economic sustainability. Together, we are also testing a prototype community fishing association that could hold and manage all of our permits. Recognizing the demand for seafood and the importance of fishing to the culture and heritage of the community, we want to help build a foundation for long-term sustainable marine ecosystems.

We’re always thinking about how we can better link people with nature; to show how nature is not only relevant to our lives but essential to our well-being. It is clear that nature provides us with the basics for our survival – water, food, and shelter – but when we think about our own well-being and the well-being of the natural places around us, we tend to separate them. We need to bring that thinking back together, to make investing in what we call “natural capital” – all the things that nature provides to people – as routine as investing in man-made capital.

WORKING WITH COMMUNITIES

Here's a small but powerful example. In the Solomon Islands, the Conservancy works with local communities, helping them to come together to protect their marine resources. We started simply by identifying places that we thought should be protected. Then we worked with local people to establish a protected area – the first community-managed protected area in the South Pacific. In the ten years since this began, corals and reef fish have flourished. Tourism has grown. New livelihoods such as seaweed collection have emerged. This has inspired other communities to work with us to establish their own marine protected areas, providing solutions for people and nature.

As this example shows, we can change people's thinking so that they see nature as an asset that needs to be invested in and taken care of. But our examples tend to be case and place specific. In most instances, the message hasn't reached beyond a small audience. In spite of over a decade of talk about "natural capital" and "ecosystem services," the world at large still does not think of nature as an asset. People don't equate spending money on conservation with investing in the future.

FORESTS AND CLIMATE CHANGE

Today I would like to talk about one arena in which things are changing. The reality of climate change is forcing us to rethink some of our old ideas. Suddenly, we face the possibility that the forests, rivers, and coasts we take for granted may not always exist in their natural state, and we realize what we could lose. The world is beginning to grasp that we have to act – and act now – to minimize the damage.

An important part of that action involves forests. Now, of course we must be sure to reduce greenhouse gas emissions by reducing our use of fossil fuels and increasing energy efficiency. But about 20 percent of the world's greenhouse gas emissions come from deforestation, and there is also enormous potential for sequestering carbon in replanted and well-managed forests. We can't solve the climate problem without finding a way to solve the deforestation problem.

To do this, we must change the economic incentives that are causing people to destroy and degrade forests. Imagine a market that could provide billions of dollars for replanting trees, protecting standing forests, and improving the way timber is harvested. That is what we are talking about when we talk about the potential of carbon markets, and the role forest carbon might play in them.

This is a powerful idea, that we can put a value on the benefits that standing forests provide to people and actually trade it in a market. This is what a major conservationist friend has called, "the most transformative idea in conservation since the national park." We are building a market around things that until now have been largely taken for granted.

How can we put this powerful idea into practice? First, a market requires scarcity. Without it, there is no value. In the case of carbon, scarcity is created by placing a limit on the amount of greenhouse gases companies or others can emit – the "cap" of a cap-and-trade system. In turn, the government creates allowances in the amount of

It is clear that nature provides us with the basics for our survival – water, food, and shelter – but when we think about our own well-being and the well-being of the natural places around us, we tend to separate them. We need to bring that thinking back together, to make investing in what we call "natural capital" – all the things that nature provides to people – as routine as investing in man-made capital.

the cap each year. Entities that are covered by the cap – major emitters such as power plants and industrial facilities – receive or buy allowances for a certain level of emissions. They are then free to get their emissions down to that level in the best way possible. For some, that will mean applying cleaner technologies and other practices. Where costs are high or other solutions are impractical, others may opt to purchase allowances from other companies – the “trade” part. Or they can pay to reduce emissions from sources outside the cap, like forests, and receive credit for these reduced emissions. The key is that companies can choose the most cost-effective way to reduce their emissions. As long as the cap is enforced and the rules are well designed, the result to the atmosphere will be the same.

This is where forest carbon comes in. Trees take in carbon, storing it in wood and the forest soil. When forests are cut down or degraded, carbon is re-released to the atmosphere. So planting more trees and restoring forests can reduce emissions by capturing and storing carbon dioxide. And stopping the destruction of existing forests can prevent forest-based emissions from happening in the first place. It may turn out that companies required to reduce their emissions can do so most cost-effectively by buying forest carbon credits, and that’s where the huge potential source of financing comes from for forest protection and restoration.

Many of you know that the “offsets” I just described sometimes get a bad name. But provided there are decent quality controls, and we believe there can and should be, what we are talking about is simply another form of emissions reduction here on planet Earth. In the end, because carbon dioxide causes climate change no matter where it is emitted, it all makes a difference.

This is how the carbon market works, but the reality today is that carbon markets are still in their infancy, and forest carbon is only a small slice of those markets. The market for carbon credits began to emerge in the mid-1990s. Negotiations on what famously became the Kyoto Protocol, part of the 1992 UN Framework Convention on Climate Change, were in full swing. The goal in Kyoto was a system in which developed countries committed to reducing their greenhouse gas emissions. There was active debate on whether emissions trading mechanisms, including offsets, would be allowed under the agreement. One issue of particular interest was whether the protection and restoration of forests would be eligible as offset activities.

This possibility set off a wave of experimentation around forest offsets. U.S. energy companies anticipating regulation under Kyoto saw an opportunity to invest in forest activities for their carbon benefits. They were motivated to “get in on the ground floor,” both in hopes of potential “early action credits” and also to learn the ropes of these projects before regulations took effect. The Conservancy saw a vehicle to both address climate change and finance essential forest conservation work.

LEADING THE WAY – FORESTS AND CARBON FINANCE

Between 1991 and 2008, The Nature Conservancy initiated 10 climate action projects in Paraguay, Belize, Bolivia, Brazil, the United States, and China, in partnership with

In spite of over a decade of talk about “natural capital” and “ecosystem services,” the world at large still does not think of nature as an asset. People don’t equate spending money on conservation with investing in the future.

companies such as American Electric Power, General Motors, British Petroleum, Duke Power, and Pacific Gas & Electric. Today we have a large portfolio of forest carbon projects. Through these projects – two of which I’ll talk more about in a minute – we have conserved important biodiversity and contributed to sustainable livelihoods for local communities. Importantly, however, we also broke ground on how forest carbon projects can be implemented, creating examples that are now being followed by others.

Unfortunately, forest carbon markets have never lived up to the promise that they once showed. Why? There are three reasons.

First, after extended debate, the negotiators in Kyoto decided that there were too many uncertainties around carbon credits for avoided deforestation. For example, how could we possibly account for carbon that was not emitted because we did not cut down a forest? Would avoiding deforestation in one location simply shift it to another location? Do offsets simply decrease pressure on polluters to develop and adopt new, cleaner technologies? There were many other questions. As a result, the Kyoto negotiators excluded avoided deforestation from the protocol’s offset mechanism, the Clean Development Mechanism, known as CDM.

Secondly, again in part because of perceived uncertainties around forest carbon, these same negotiators set up cumbersome rules for trading credits from reforestation projects. As a result, only one reforestation project was ever approved through the CDM, and only after an enormous amount of effort by the world’s leading experts.

These decisions amounted to the effective exclusion of forest carbon under Kyoto. This was repeated when the European Union decided to exclude all forest offset credits from its emissions trading system. Lastly, the U.S., which accounts for nearly a quarter of the world’s emissions, has not committed to emissions reductions. This means there is no meaningful economic reason for U.S. entities to invest in forests for their carbon value. So there has been very little demand for forest carbon from the compliance markets, where the vast majority of the world’s carbon trading takes place today.

There *have* been a number of forest-related projects in the voluntary market. Individuals and corporations are attracted to forest offsets. A big reason for this is the co-benefits, namely, protecting forests and their biodiversity, as well as helping local communities. But project quality in the voluntary market varies widely. Until very recently there were no quality controls, and as a result there are all kinds of projects out there, good and bad. The bad ones serve to perpetuate the kind of skepticism that has kept forests out of more formal markets thus far. The Conservancy has sought to provide examples that meet the highest possible standards, with the goal of setting precedents that could be adopted into regulation. But the conclusion is clear: without new policies that drive demand, there will be no significant market.

So we are stuck. Avoided deforestation projects – which we now refer to as REDD projects, which stands for Reducing Emissions from Deforestation and Forest Degradation – are excluded from official markets. Reforestation projects are stifled by complex rules. Both of these problems are driven by an underlying skepticism that has been slow to change about the validity of forest carbon as a strategy to mitigate greenhouse gas emissions.

We can’t solve the climate problem without finding a way to solve the deforestation problem. But to do this, we must change the economic incentives that are causing people to destroy and degrade forests. Imagine a market that could provide billions of dollars for replanting trees, protecting standing forests, and improving the way timber is harvested. That is what we are talking about when we talk about the potential of carbon markets, and the role forest carbon might play in them.

The good news is that there is now room for hope, for two big reasons. First, especially in our current economic environment, governments and corporations are interested in cost-effective and proven ways to reduce greenhouse gas emissions. We need to address climate change in a way that will not shock consumers and businesses, particularly in places that rely heavily on high-carbon fuels such as coal. Climate policies must be politically viable and economically sustainable.

It just so happens that forest carbon provides an opportunity both to substantially reduce emissions and to keep costs down. So in the context of a cap-and-trade program, saving the rainforest in Brazil can help us reduce emissions faster while saving jobs and easing the shock to consumers in Connecticut, Ohio, and a host of other places. Why? Because stopping deforestation in Brazil may cost less than installing new technologies or retrofitting old power plants, but could still provide the same emissions reductions. Companies can choose what makes sense for them, and make the most of their resources.

Second, the science of forest carbon has come a long way since Kyoto. Yes, there are still many technical issues that we have to address. But work by the Conservancy and others has demonstrated that forest projects can provide credible and measurable emissions reductions. Technical solutions now exist for many of the questions that tripped us up before.

So how do we turn these developments into a real market? To answer that, I'd like to share some of the Conservancy's on-the-ground experience, the lessons we've learned, and what we think needs to be done as a result. When we began our journey into the world of carbon finance in the early 1990s, there were no rules and no precedents to follow, so we had to find our own way. We encountered two types of challenges. First, there were technical challenges, primarily around how to reliably measure and account for forest carbon. Second, there were socioeconomic challenges focused on how to design and implement projects in a way that worked for the many parties involved.

THE CASE OF NOEL KEMPPF

I'll focus on two projects: The Noel Kempff Climate Action Project, an early REDD project in Bolivia, and a current project we are developing on the island of Borneo in Indonesia. Noel Kempff was launched in 1997, when 1.5 million acres of tropical forest in Bolivia were threatened by logging and other unsustainable uses. The destruction of these forests would have released millions of tons of carbon and destroyed critical habitat for endangered species such as the Brazilian tapir and jaguar. It also would have threatened the livelihoods of local communities. Working with the Bolivian government, local conservationists, and three U.S. energy companies, we bought out four logging concessions and incorporated their forests into an existing national park. Our actions gave these areas permanent protected status. This was critical because the "permanence" of forest carbon had been questioned, so we needed a way to show that none of the emissions avoided by this project would be released later, undermining the climate benefits of the project.

So there has been very little demand for forest carbon from the compliance markets, where the vast majority of the world's carbon trading takes place today. There have been a number of forest related projects in the voluntary market. Individuals and corporations are attracted to forest offsets. A big reason for this is for the co-benefits, namely, protecting forests and their biodiversity, as well as benefiting local communities. But project quality in the voluntary market varies widely. Until very recently, there were no quality controls.

Another fundamental challenge for this project was determining how much carbon would have been emitted if the project hadn't happened – the so-called “baseline.” To make matters more difficult, credible carbon projects must deduct any new deforestation that happens elsewhere as a result of the project. This is known as “leakage,” and is where Noel Kempff really broke new ground. Among other things, we undertook an assessment of the timber harvest that had in fact shifted to elsewhere in Bolivia. Based on these results, we applied a 14 percent discount rate to the emissions reductions the project had generated. We also had the project independently verified. This allowed the project partners and investors to be confident that we were getting real emissions reductions.

Equally important in Noel Kempff were the social and legal issues. Bolivia is one of the poorest countries in the Western Hemisphere. Small-scale conversion to agriculture was one of the drivers of deforestation, and the timber concessions employed local people. To ensure the success of our project, it was important to create new, sustainable economic opportunities for local people and assist them in securing legal title over their traditional lands – a key ingredient in economic stability. The project also stipulated that proceeds from the sale of the Bolivian government's share of the offsets would be channeled back into economic development in the region.

Because of the effort put into it, Noel Kempff is probably the world's best-known avoided deforestation project. It is now being looked at by many as a standard for future REDD projects. Fast forward to 2009. We are building on our experience in Noel Kempff and are now working to develop an innovative REDD program in the Berau district of Indonesian Borneo.

THE CASE OF INDONESIAN BORNEO

Indonesia is actually the world's third largest emitter of greenhouse gases, behind the U.S. and China. Eighty percent of Indonesia's emissions are from deforestation. Unsustainable logging, the rapidly growing oil palm industry and other threats have caused the greatest rate of deforestation there than in any other country on Earth. At the same time, the rainforests of Indonesia are some of the richest in the world. They are also home to many endangered species, including orangutans, Asian elephants and clouded leopards.

Our approach is to identify one area of this large and diverse country where we can demonstrate the ability to (1) combat deforestation at a large scale, (2) support sustainable economic development for local communities, and (3) credibly measure the avoided emissions. The size of Berau is about 5.4 million acres – much larger than an isolated project, but a manageable size for a demonstration site. Our goal is to dramatically reduce future forest loss within five years by (1) improving logging practices, (2) directing oil palm development to already deforested areas and (3) enhancing government land use zoning and enforcement. To do this, we are collaborating closely with district, provincial, and national governments, as well as NGOs and communities in the Berau region. Note that these interventions do not

stop development and job creation in Berau. Logging and oil palm production will continue, but under a more sustainable model that reduces forest loss. Local companies and communities will receive incentives to participate in this plan. Forests, watersheds, and critical orangutan habitat will be better protected. And the world will benefit from reduced emissions equivalent to removing one million cars annually.

Building on what we learned at Noel Kempff, we are measuring the carbon benefits from these activities and addressing head-on the issues of baselines, leakage, and monitoring. A key issue is the need to prove that any emissions reductions we claim are over and above what would have happened without our intervention, a concept known as “additionality.” Once these carbon benefits are quantified, we expect that they will be sold to investors to provide additional funding and incentives for local companies and communities to protect their forests.

If successful, this project will be a powerful model for reducing forest loss and carbon emissions in a socially beneficial and scientifically credible way. So what have we learned?

1. That scientific and technical questions can be resolved with rigorous methods and transparency;
2. That it is important to involve local communities, businesses, and governments in designing solutions that will last; and
3. That we need to work at a national level with government support and engagement to ensure long-term stability.

The promise of including forest carbon could go a long way toward engaging developing countries, giving them a mechanism both to reduce emissions and to benefit from a market for lower-cost offsets.

CARBON MARKETS AND FINANCE TODAY – A ROLE FOR FORESTS

This brings me to where we are today. The movement to seriously curb emissions is gaining steam. Why? Climate change is no longer in question. We must reduce emissions dramatically and quickly. In the United States, a new administration and Congress have signaled a new resolve to act on climate change. We have the opportunity, this year or next, to pass the most significant environmental legislation since the Clean Air Act Amendments of 1990.

At the same time, and closely related to what we decide to do in the U.S., the nations of the world may adopt a new global treaty in December 2009 that can move all countries to greater action to reduce emissions. Getting there won't be easy. It will require commitments from big emitters, like China and Brazil, and other developing countries, as well as the United States. The promise of including forest carbon could go a long way toward engaging developing countries, giving them a mechanism both to reduce emissions and to benefit from a market for lower-cost offsets. In fact, in terms of international negotiations, developing countries have been the primary drivers of the forest carbon discussion since 2005. That was when Costa Rica and Papua New Guinea led the Coalition for Rainforest Nations in calling for new incentives to reward developing countries for their efforts to conserve their remaining forests.

What is necessary to ensure that these profound opportunities become real, so a robust carbon finance framework for forests can get underway? First, at a macro level,

the most critical thing we can do is to ensure that there are real commitments to reduce emissions. This means that a U.S. greenhouse gas cap-and-trade bill should be adopted swiftly. In addition, we need a strong post-2012 international climate regime. The passage of U.S. legislation with a strict cap on emissions is critical. Without it, we will have no credibility in asking the rest of the world to take on further obligations. And we will have nothing to drive demand for carbon credits, including forest carbon. The Nature Conservancy is on the front lines working to ensure that a strong U.S. climate bill is enacted and an international agreement is reached, ideally this year.

Second, a forest carbon system must be built on very high standards for carbon accounting and environmental credibility. A ton of emissions reductions claimed must be a ton actually realized. Strong standards for monitoring, reporting, and verification are needed. As we've noted, credible mechanisms to address leakage are needed. Issues such as permanence and additionality must also be addressed. Today's voluntary standards provide us with a good foundation, but must be adapted to work at a much larger scale of activity. We need to continue to invest in forest monitoring and inventory systems in tropical regions and ensure that this data is made widely available.

Third, mechanisms to protect and restore forests will not succeed unless they take into account the needs of local communities. Along with carbon standards, we need principles and standards to ensure that forest communities, including indigenous peoples, are not harmed. Communities should be able to participate in the design and implementation of REDD activities. Properly-designed REDD mechanisms can and should benefit local communities. This was the case in Noel Kempff, where indigenous communities gained tenure to their lands and project proceeds were invested in local infrastructure. Now we are working to make this a cornerstone of our work in Berau as well. Embedding these principles in a REDD mechanism is not simple, because questions of international law and national sovereignty are involved, but it is necessary.

Fourth and last, it is critical that we scale up the level of activity on REDD. This means that a REDD mechanism needs to create incentives for national governments to attack deforestation so they can deploy a wider range of tools than a smaller-scale project developer. For instance, combating deforestation could include improved forest governance, agricultural reforms, infrastructure planning, and land tenure reform, to name a few.

There are questions, though, about how national-level REDD programs will function with carbon finance. Will private investors be drawn to invest with national governments, as opposed to the smaller project activities that have proliferated thus far? How will this affect perceptions of risk? Are there hybrid models that can establish incentives at both national and project levels? We are engaged on these questions in consultations with investors, policy makers, and others, and in pilot projects like Berau. These are some of the critical elements that we believe a REDD mechanism will need to address. We and many others are hard at work to enable agreements among policy makers, project implementers, communities, and the private sector.

The private sector is critical to this effort, and we need to make sure it is engaged. That means sending long-term, stable signals about what is expected, and then creating the financial mechanisms to make those possible. The Conservancy has been

working with more than two dozen major companies – like General Electric, Xerox, GM, Shell, and DuPont – and other environmental organizations. Our group – the U.S. Climate Action Partnership, or USCAP – has released a Blueprint for Legislative Action. In it we highlight the need for high-quality forest carbon and other credits to play a major role in a carbon cap-and-trade system. It also contains what we think are some innovative and practical ideas for addressing climate change in a way that leverages the power of carbon markets to support conservation. I want to touch on one idea briefly, but you can see the whole blueprint on the web at www.us-cap.org.*

* United States Climate Action Partnership (USCAP) is a group of businesses and leading environmental organizations that have come together to call on the federal government to quickly enact strong national legislation to require significant reductions of greenhouse gas emissions.

One element in the Blueprint that could have interesting implications for forest carbon finance is a proposal to establish a strategic offset and allowance reserve pool. This would be something like the strategic oil reserve that the United States maintains in case of emergencies. The idea is that this reserve would buffer the carbon market – and, by extension, the economy – if carbon prices rise or fall significantly. The government would fill the reserve by buying large quantities of emission reductions, with forest preservation activities a leading candidate. This could direct billions of dollars to reduce emissions from deforestation, while getting additional emission reductions beyond the cap. These credits would not be released to the market unless and until the carbon price rose to a point at which the government felt it was necessary to intervene.

Some are skeptical of the use of markets for forest carbon. We are not. With the strong environmental and social standards I mentioned, we believe – and our projects have demonstrated – that markets can work to achieve multiple goals. If we design the system right, carbon finance has the potential to leverage unprecedented levels of investment for mitigating climate change and protecting tropical forests.

CONCLUSION

People often ask, particularly given my background at Goldman Sachs, how I feel about the worlds of markets and conservation coming together. As is probably obvious from this discussion, I think it is a natural evolution. We invest in infrastructure, in capital, in all the things we value. Why not do the same for nature? I'd argue that it is critical that we think about nature as part of how we go about building our economy and promoting human well-being.

Today, forest carbon has the largest potential for transforming the way we think about nature. Maybe this thinking can be extended to other benefits we get from forests, like water filtration, erosion control, or even biodiversity. This kind of thinking starts to change attitudes, to reach people who never really think about conservation. It opens up new conversations and builds new alliances. It provides a way for us to create win/win situations with nontraditional allies such as corporations.

If we can make forest carbon work, it may also give us a new way of looking at other natural systems, like mangroves and wetlands, and the benefits they provide to humans. In the shorter term, maybe there are lessons we can draw from how carbon markets are developed and used that will provide us with models for other services, too. The Conservancy is exploring these ideas already. For example, we are working

on developing mechanisms in several places in South America to better link people to the lands their water springs from. The basic idea is that water users – hydropower plants, brewing companies, municipal agencies that provide water to the public – contribute to “water funds” that are then used for conservation efforts upstream. These efforts vary, depending on need, but include things like paying landowners in Brazil to maintain forests or plant trees to prevent sedimentation, working with farmers in Ecuador on conservation-friendly agricultural techniques that limit waste and fertilizer runoff, and providing funds for existing parks that protect water sources for Bogota. Again, the key is making the link between nature and people. Just the funds we are working on in Brazil, Ecuador, and Colombia are helping supply clean water for well over 20 million people. At the same time, upstream landowners can continue to use their land, and are compensated for some of the other public benefits they provide. Without such mechanisms, these benefits could be lost as privately owned lands are sold or converted.

Making these kinds of changes in thinking will take time. It is risky and difficult, but I believe it can be done – consider the success of cap and trade mechanisms to reduce acid rain. The critical step now is for us to demonstrate how forest carbon can work, and then use that information to inform decision makers across government and the private sector. That is what The Nature Conservancy is setting out to do. In the end, I believe we will be able take conservation to a new level, and, if we really do this right, change the way people think about nature.

Question & Answer Session

QUESTION 1: Forest vs. other carbon offsets

Why would compliance buyers be interested in forest carbon? I could see the appeal of forest carbon for voluntary buyers because of the co-benefits, but for compliance buyers it seems like there are many less expensive forms of carbon that are out there. Could you discuss why buyers would prefer forest carbon, because it seems like investors prefer looking at things like methane and HFC23 flaring?

It depends a little bit on where the cap is set. The Conservancy, through the USCAP, talked about a 2020 target of 20 percent below 2005 emissions levels. The business community regards those targets as very tough to achieve and is very concerned about the costs of achieving them. Our analysis suggests that forest carbon will be very economically competitive given the range of alternatives available. In most cases, the dollars just have to exceed the alternative use of land, and those alternative uses often do not generate a very high value.

In turn, unlike some of the more controversial CDM offsets that are happening right now, forests provide all of these additional co-benefits: protecting biodiversity, helping local communities, and protecting nature. And so, for cost reasons and the co-benefits that go with protecting forests, the businesses that we have worked closely with in USCAP find forests to be very attractive.

QUESTION 2: Permanence and leakage with forest offsets

How are you addressing the issue of permanence with the forest fires that are common in Indonesia for land-clearing, with respect to the biodiversity drivers behind choosing those sites and the habitat issues there? Also, how are you dealing with leakage? I doubt the demand for cheap pulp wood is going to go down necessarily as a result of this project.

There will always be risks to these projects. Take fire, for example. The first thing to do is to economically incentivize people to take care of their forests by paying for proper natural resource management. That is the first thing. Secondly, you have to have insurance or create a buffer. For example, if you protect an area that produces X credits, then maybe the forest credits that are sold from that project are X minus some buffer zone or discount. Those kinds of discount factors would work. There should be pretty simple financial mechanisms to deal with that.

Leakage is a little bit more complicated. Ultimately we would be an advocate for doing forest conservation on a national scale. In other words, a country would only benefit if it committed to targets on a national basis. The country would then be incentivized to be mindful of any potential leakage issues. In order to get from where we are to there, the Conservancy is an advocate of doing project-based approaches as well. In our Noel Kempff project, we did the work to calculate how much leakage occurred and discounted forest carbon benefits. These are all fair issues that have to be addressed, but none strike me as insurmountable.

Take palm oil degradation, for example. If you can incentivize palm oil companies to use already degraded land rather than new forests, then there does not need to be leakage, and the palm oil plantations can still be accomplished. If you incentivize people right in the first place then they are incentivized to manage, monitor and worry about leakage. And that ought to be a pretty powerful force to address it. It doesn't mean it makes it all go away, but it doesn't mean that these issues should stop us from pursuing REDD projects either.

QUESTION 3: Governance and forest carbon projects

With all of the governance problems around tropical forests, like corruption at the national level, failure to get the best economic benefits down to the community level, illegal logging, etc., as a practical matter, how do you think these sorts of mechanisms will work from a governance point of view at the national scale? Or, phrasing it differently, how long will the project phase need to be in order to create the national governance levels that will support good REDD projects down the road?

Our basic premise on all of our projects in developing countries is that our conservation projects, whether they're REDD related or not, will only work if the local people benefit from them. No matter what you do to enforce conservation, local people will be incentivized to take care of themselves. And who can blame them? They have to look after their livelihoods first. This is the premise of all our work. Our experience in Noel Kempff is pretty encouraging. We have been at it now for a long period of time, and it works, although not in a densely populated area.

Indonesia is a tough setting to make this work. You might say, “Well, if the deforestation that happens today is illegal, then a stroke of a pen isn’t going to do anything.” Agreed! But today there is no better economic alternative for people there, and so they are economically incentivized to illegally deforest their project. Alternatively, if the local communities can be incentivized to benefit from protecting the forest, it seems to us that economic benefit can replace the old incentive and incentivize them to protect as opposed to degrade the forest.

We need government support, for sure. That is why we have federal, state and local governments involved. We have the leaders of the local communities involved. We have forestry operators who are signing up and are interested in sustainable forestry. The potential dollars from the carbon benefits are significant. It takes old fashioned work, I think, to make sure the dollars flow through, and it works. Is it easy to do? No. Is it worth the hard work? Yes. It is going to take hard work, and it won’t happen overnight.

Some people point to these issues and say, “Therefore, we should never pursue REDD projects.” But I say, you could take your pick of any aspect of a cap-and-trade system, and a good critic can point to lots of challenges and issues. These systems are new, complicated and it will take some hard work to make them work well. But you do not want the perfect to be the enemy of the good. We should hurry, too, because in the meantime the rainforests are going fast!

QUESTION 4: Renewable energy impacts on conservation

I know that you just hired a Renewable Energy Director in Minnesota under the umbrella of the Conservancy’s work on climate change. To what extent are you focused on using Conservancy lands for the sustainable harvest of biofuels for renewable energy or other sources of biofuels?

I am not sure that I know the answer to that question. In my defense, I’ve only been on the job six months! But we are focused on renewable energy. Renewable energy is kind of a tricky area because the dirty secret of renewable energy is that it is extraordinarily land-intensive.

I recently went to Oklahoma City for a big conference on wind energy. There were about 2,000 people there. There were two keynote speakers: the opening keynote speaker was T. Boone Pickens, and the closing keynote speaker was me. My task was to talk about how the pursuit of wind farms and wind energy can do a lot of harm from a biodiversity perspective. The good news in the case of the Oklahoma wind community is that they are very interested in that because they want to be good, responsible citizens. They’re interested in our scientific help in siting wind farms. That said, it is a complicated issue, and it is not going to go away. Renewable energy is not the answer to everything. Unfortunately, that is why we need conservation.

The same issue exists with solar thermal. California has this huge solar thermal opportunity in the Mojave Desert. And to California’s credit, as they plan their smarter energy future, they are explicit in acknowledging the need to be smart about biodiversity locations because the solar thermal facilities are like big industrial plants right in the desert.

And then, of course, there is the smart grid. There is lots of talk about the smart grid now because President Obama wants it to be a part of the stimulus plan, which is good, but again it raises some conservation issues.

We are paying a lot of attention to renewable energy and how it intersects with our work. I think you can expect the Conservancy to speak up on these issues. Of course, we are for non fossil fuel energy, and we want to support renewable energy, but we want it to be designed in the smartest way possible. The good news is that the key players in those industries seem very receptive to working with us on that.

QUESTION 5: Establishing a cap and the supply of allowances and offsets

Recognizing the potential productive role that offsets can play in reducing abatement costs, I have a question about the quantity of offsets that are recommended in the recently released USCAP plan. I believe the provision I read in USCAP is that Congress should establish a carbon market board and give it the authority to set annual limits on the level of domestic and international offsets within the range of 2 to 3 billion metric tons in total, and that they should establish an initial limit of 2 billion metric tons but also have the authority to increase that limit to avoid undue economic harm from excessively high allowance prices. Just looking at the figures, my data says that in 2005 total U.S. greenhouse gas emissions were only 7.2 billion tons. Is it wise for USCAP to set initially such a high bar on the allowance of offsets that will be permitted? Is there any concern they could potentially overwhelm the entire cap and undermine overall emissions reductions under the proposed regime?

USCAP is really explicit about the need for the offsets secured from forests to be real offsets – to be verifiable, to institute tough monitoring, etc. It is very explicit. In response to the underlying quality question, the presumption is that any forest offsets per USCAP will be good ones.

The quantity question is a fair one. How many offsets should be permitted? There is a lot of debate on this issue. There was a lot of debate within USCAP because some folks were for fewer offsets with higher carbon prices. Higher carbon prices would incentivize more investment in alternative energy, which is fair logic. On the other hand, very high carbon prices would be tough on the economy, maybe so tough that our cap and trade scheme is eliminated. You have to make this work with the economy.

Those numbers represent the consensus recommendations of the participants in USCAP. And like every aspect of USCAP, there was a lot of debate about that. I bet those numbers represent no single organization's individual point estimate. USCAP is under no illusion that it is writing the legislation. I think those are good recommendations. We were attracted to those big numbers because it will allow for a lot of really good forest-based offsets, and we think they will work. That is very attractive for the Conservancy. Some of the companies involved in USCAP also viewed them as attractive because they called offsets "cost-containment measures," which is fair enough because you do need to make this work economically. Others were leery of there being too many offsets because they were attracted to a higher carbon price. You need to balance all this, and it is very complicated.

QUESTION 6: Ensuring local community benefits from forest carbon projects

I was very encouraged to hear you talking about the need to set good social conditions and objectives, because in Australia we have certainly seen a lot of controversy over the social impacts of reforestation and REDD programs. Are you seeing any common lessons coming from your different projects about the settings that need to be put in place to ensure that local communities really do benefit?

As a newcomer to The Nature Conservancy, it has been very interesting to me to see our work overseas. Our staff is, by and large, trained in conservation science. They are biologists, ecologists and scientific specialists. Sometimes, however, the work they do is less science and more social development – anthropology-based work with local communities.

We also have to seek good local partners. We are a great partnering organization, but we tend to partner with other conservation NGOs like the World Wildlife Fund (WWF), Conservation International (CI) and the Wildlife Conservation Society (WCS) – people like us. Why don't we try partnering with organizations that bring complementary skill sets, and particularly in the area of working with local communities, so that they can help ensure that our conservation programs really do benefit local communities? If we can really connect with local people then we will be more successful from a conservation perspective.

We are getting better at it. It really is now the major driver of our international work. I think you will see new partnerships for folks who are still going to school and focusing on those topics. I think you will see organizations like the Conservancy hiring people from World Bank-type of organizations with different backgrounds. We are trying to partner with organizations such as CARE and Oxfam now. I do not want to pretend that we figured it out – there is a lot of work to do – but we are smart enough to know that we will only succeed if we accept the challenge of ensuring that our projects in developing countries connect to local people. There is good evidence of this working on a small, project-by-project scale, but the challenge will be, of course, to achieve that on a massive scale.

QUESTION 7: Cap-and-Trade vs. carbon tax

Since you probably have some influence on the cap-and-trade legislation that is currently working its way through Congress and the White House, I am concerned about the potential involvement from the federal government to manipulate the cap-and-trade market to meet the individual needs of various political constituencies. Is there a better alternative to a complicated cap-and-trade system? What about a carbon tax?

A lot of people are talking about a carbon tax, which is really starting to slow things down. They do not want anything to happen, and they know full well that no political leader is going to stand up and advocate a new tax. When was the last time you saw that? It has been a while.

First, I see no evidence that a carbon tax could ever really happen. Secondly, some people say, "Oh, tax would be so much simpler." Really? You just used it as your example: "a complicated cap-and-trade system." I agree – cap-and-trade could get as

We also have to seek good local partners. We are a great partnering organization, but we tend to partner with other conservation NGOs like WWF, CI, and WCS – people like us. Why don't we try partnering with organizations that bring complementary skill sets, and particularly in the area of working with local communities, so that they can help ensure that our conservation programs really do benefit local communities? If we can really connect with local people then we will be more successful from a conservation perspective.

complicated as the tax code. Taxes in the United States are never simple. Third, a tax would make this a partisan issue. You can imagine a Democratic administration advocating a carbon tax and Republicans attacking carbon tax. The issue would then continue the debate through different administrations and never come into effect. I do not know that a carbon tax is better, but I do not think it is viable, and I suspect that a carbon tax is just as complex as a cap-and-trade system.

There is real momentum to have a cap-and-trade system. That does not mean that it will be easy to legislate, but there is momentum. Credible bills have been proposed. Cap-and-trade has the real benefit of putting a firm cap on emissions. Cap-and-trade blends into the system that Kyoto participant countries have advocated. I think it has all those benefits, but it is definitely complex, and we just have to fight our way through it. So, the Conservancy is engaged.

The real reason the Conservancy got engaged is because our job is to protect nature. We want to make sure that whatever climate legislation is enacted protects nature, so we're focused on forest carbon. We are focused on adaptation to inevitable climate change through nature-based systems. We are focused on the unintended consequences from promoting biofuels through bad land-use practices, management, etc. The Conservancy is engaged and we will do our best to make sure whatever is passed is as benign to the economy as possible while protecting nature.

QUESTION 8: Environment vs. the economy and the mission of The Nature Conservancy

With everything that has happened in the last three or four months with the drop in oil prices and changes in the U.S. and global economy, what do you see as the problems out there that have developed on a worldwide basis that affect the mission of the Conservancy?

Where should I start? It is kind of daunting! Of course, you have to worry that in a time of economic turmoil leaders will say, "We can't afford to worry about environmental matters at a time like this." We argue strongly that this should not be the case! Environmental protection and economic progress depend on smart environmental investments. They go hand in hand, and you have to worry about that. One can only be sympathetic to a state like Ohio. I grew up in Ohio. It is already in tough economic shape. It continues to lose jobs and it is a coal-based, energy-driven economy. Climate change legislation scares the hell out of people in Ohio because they say, "We'll just lose jobs to China." It is a tough question, and we have to worry about it. That is the biggest thing that has changed recently.

The good news about higher oil prices is that it promoted a transition from fossil fuel economies to a clean energy economy. One hates to see the snapback that occurs so fast and so often when oil prices fall. One would hope that governments will enact good legislation to deal with that, but there is not really any good evidence that this is happening.

The biggest problem for the Conservancy's mission of protecting nature is consumption. People like to ask me about population growth. "Gosh, isn't population

growth problem number one?” No, population growth is not problem number one! The problem for conservationists is that more and more countries are getting rich enough that they seek to live like Americans. The fear on the horizon is that the Chinese and Indians will choose to follow our bad example of overconsumption. Most of the bad examples start here at home in the United States. That is why it is so critical that we do something about climate legislation; otherwise the rest of the world is going to give up because they’re waiting for us.

Forest carbon, by the way, creates an amazing opportunity for the U.S. to emerge as a leader. There is no place for forest carbon right now. So, if we enact climate legislation that includes forest carbon, who could believe it? And maybe that is what the world has been waiting for all along.

Investing in Forests and Lands: An Investor's Primer

Deborah Spalding

*Managing Partner
Working Lands Investment Partners, LLC*



September 24, 2008
5:00 to 7:30 p.m.
Luce Hall
34 Hillhouse Avenue

Deborah Spalding is a founder and Managing Partner at Working Lands Investment Partners, LLC, which specializes in the investment and long-term stewardship of sustainably-managed working lands. She has worked in the financial industry for more than 17 years, serving in senior executive positions in the U.S. and overseas. Until 2007, Ms. Spalding was a Partner at Chaplin Global, LLC, an alternative asset management organization based in New York. Previously, she was Executive Director and Head of International Investments for Schroder Investment Management NA, where she was lead portfolio manager of \$6 billion in institutional client assets. Prior to this, she worked at Scudder Kemper Investments as Managing Director/Head of International Institutional Investments and lead portfolio manager for \$10 billion in client assets. She began her career as a financial analyst at SKB & Associates, responsible for the electric utilities, food, and building materials industries.

Ms. Spalding holds a Master of Forestry from Yale University, an M.B.A. from the University of California, Berkeley, an M.T.S. from Harvard University, and a B.A. from Tufts University. She has served on several boards including the National Wildlife Federation, where she is a member of the Executive Committee, the Connecticut Forest & Park Association, and the Guilford Land Conservation Trust. She is a Trustee of the NWF Endowment and the Robert & Patricia Switzer Foundation, where she chairs the investment committee.

Chapter 3

Investing in Forests and Lands: An Investor's Primer

Deborah Spalding, CFA
Managing Partner
Working Lands Investment Partners, LLC*

This chapter provides an investment firm's point of view on land investment with a focus on the role of environmental markets and ecosystem services. It begins with an overview of the compliance and voluntary carbon markets and how they apply to forests and other land uses. Through the course of the discussion, the author gets deeper into the challenges faced by investors who seek to use carbon markets as another source of revenue in their ecosystem services toolbox. It ends with an example of a project that takes the reader through an actual deal that highlights the potential sources of revenue and returns for a project that has ecosystem service value. The reader will be left to contemplate what the role of carbon markets will be for forest and land investors, and whether or not they are a viable source of revenue for strategic investors like Working Lands Investment Partners.

* For more information on Working Lands Investment Partners, please go to www.working-lands.com

INTRODUCTION

Mark Ashton's chapter in this volume, "People, Forests and Land Use: A History of Resource Exploitation, Conservation and Sustainable Management," provides an overview of forestry from the perspective of an ecologist looking at sustainable forest management. I will be doing essentially the same thing except that I will provide an investor perspective on forests, lands and carbon investing, and delve into the considerations undertaken by land owners and investors when making decisions about where to source investment returns.

I will start with a basic overview of why we care about terrestrial carbon, and then I will discuss the multiple markets available to investors, in addition to carbon. It is very important to remember that when investors make their decisions, they think about a variety ways to generate returns and do not limit

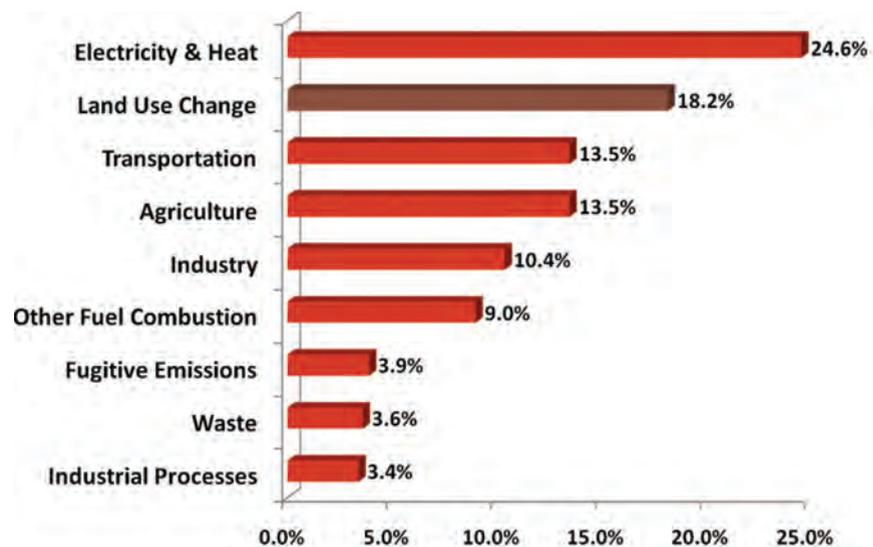
themselves to just carbon or ecosystem services. As such, it is important to consider the wider context of revenue-generating opportunities.

Afterwards, I will provide a primer on the carbon markets, run through some terminology, and, for those who may be less familiar, give a brief update on where we are today. I will discuss some of the structural and financial challenges that land investors face when deciding whether to engage in ecosystem services markets. For this I will focus primarily on carbon and walk through a sample investment project. Finally, I will end with some thoughts about where to go from here.

TERRESTRIAL CARBON: AN OPPORTUNITY FOR CLIMATE CHANGE?

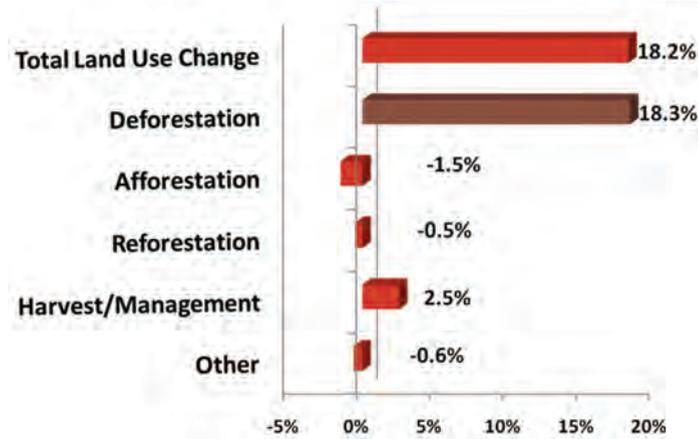
Terrestrial carbon is a key component of the global greenhouse gas emissions budget. That is why questions about the role of forests and the role of agricultural land take center stage when we talk about climate change mitigation strategies. Greenhouse gas emissions from land use change are a fairly significant component of the overall emissions budget (see Figure 1).

Figure 1 Global greenhouse gas emissions by end use activity¹



There is some variability around these numbers. Some people say land use change makes up to 17 percent of global emissions, while others say the figure is closer to 19 percent. Suffice it to say I would look at the magnitude of these numbers rather than the decimal place. When we look at the components of emissions from land use, we see that they are largely driven by deforestation, which is taking place primarily in developing countries in tropical regions (see Figure 2).

Figure 2 Land use greenhouse gas emissions by end use activity²



CURRENT AND EMERGING MARKETS FOR INVESTORS

I am going to talk about the current markets that are available to investors, but before I do I should discuss some of my personal biases. The one thing I have learned in my experience in managing financial investments is that everybody talks their book. This means that everybody comes with a bias. My bias is that I have spent my entire career trying to maximize financial returns and, as a corollary, trying to lose as little money as possible. Therefore I tend to be very focused on the core questions: What is the risk associated with the return expectation? What is the total return on investment? Today, I am applying this within the context of more holistic and sustainable investment management in forests, but please understand that my approach is always to seek the highest possible return for the investor.

On the menu of potential returns that investors have at their disposal are traditional markets, such as sustainable timber management. This would apply to an investor who has conservation goals, like Working Lands Investment Partners, and may also include limited development potential. As many of you who have looked at timber management organizations know, developing the land tends to be a very high return-generating activity, and there is tremendous pressure to transition lands from open space to development. Our firm looks at development in a much more scaled-down fashion, both in terms of magnitude and in terms of the underlying developments themselves. We also consider other traditional revenue streams beyond timber and development, such as recreational leases to hunters, which can provide an important cash flow component to an investment.

Also on the menu are emerging ecosystem service credit markets. Unlike the traditional markets that are relatively tried and true – in which investors and land managers have a long track record – the ecosystem credit markets are less developed. These markets are nascent; they change, they are volatile. I saw a quote in a presentation made by Clark Binkley of International Forestry Investment Advisors that said, “An emerging market is a market you can’t emerge from in an emergency.”

The one thing I have learned in my experience in managing financial investments is that everybody talks their book. This means that everybody comes with a bias. My bias is that I have spent my entire career trying to maximize financial returns and, as a corollary, trying to lose as little money as possible.

I think that pretty well characterizes some of the ecosystem service markets today, and maybe our larger financial industry as well. Such emerging markets for ecosystem services include stream and wetland mitigation, water quality and quantity trading, carbon markets, and biodiversity, largely through endangered species banking.

We tend to talk a lot about markets. And until recently, markets were a very effective mechanism for creating wealth. But when we think about markets, I think it is important to ask ourselves what we expect from them. How do we envision markets? What do markets do? What is the definition of a market? Looking at traditional markets from land assets, like timber and agriculture, there are a number of basic market characteristics that apply universally.

For example, there tends to be an established product of weights and measures. There is a bushel of corn, a ton of saw timber, or a barrel of oil. There must be a sufficient number of buyers and sellers so that nobody can collude systematically. There also needs to be sufficient information transparency in terms of volumes and prices transacted. This is important because it is difficult for market participants to make rational decisions if there is no transparency. Prices in a traditional commodity market will be largely driven by supply and demand. And in fact, the markets for timber and forest products, for example, are indeed largely driven by supply and demand. Of course, there are inefficiencies in any market. But these are, generally speaking, the characteristics of all functional markets.

Markets must also have mechanisms for settling transactions, and those may be exchanges, registries, or over-the-counter transactions. Even derivative markets have mechanisms for transacting. Generally speaking, in a traditional market or a traditional commodity, the delivery risk is on the supplier. If I promise to sell you a bushel of corn, and I cannot deliver the corn that I promised, then I have to find it somewhere else, even if this means I have to find it on the spot market. This may sound fairly commonplace and obvious, but as we will see, this is not always the case in some emerging ecosystem markets.

Emerging markets for ecosystem services include stream and wetland mitigation, water quality and quantity trading, carbon markets, and biodiversity, largely through endangered species banking.

AN OVERVIEW OF CARBON MARKETS – COMPLIANCE AND VOLUNTARY

Compliance markets

There are two basic types of carbon markets. There are compliance markets, wherein participants are required to comply and to take part, and there are voluntary markets.

The compliance markets are markets like the kind created under the Kyoto Protocol, which, as I am sure all of you know, the United States did not ratify. In a compliance market, participants in a region or segments of an economy are subjected to a cap-and-trade system whereby their greenhouse gas emissions are capped at a certain level. Regulated entities are required to reduce emissions over time and are given the flexibility to trade the right to emissions rights in order to meet individual emissions reduction goals.

Generally speaking, there tend to be two types of credits within compliance markets. The first are allowances, which are basically pieces of paper that give the

holder the right to emit a metric ton of carbon dioxide equivalent. These are paper credits issued by the regulator and backed by the full faith of the legislation in place. In Europe, these credits are known as EUAs (European Union Allowances) and they are traded in the EU ETS (European Union Emission Trading Scheme).

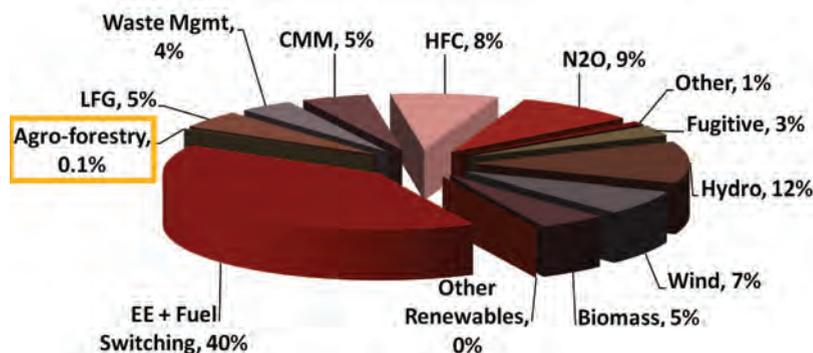
Allowances are contrasted with what are called “offset credits.” Forest carbon and terrestrial carbon projects generate offset credits. These are credits created by activities designed to either reduce emissions or to sequester carbon. Under the Kyoto Protocol, most of these are CERs (Certified Emission Reductions), and are traded under the CDM (Clean Development Mechanism).

One of the big differences between offset credits and allowances under Kyoto is that the creation of CERs is overseen by an agency within the United Nations. This is important because it means that all CERs in the CDM must go through an approval process at the United Nations. Now, for investors like me, the notion of doing anything though the United Nations is challenging, and in fact, this has been a problem for the CDM market. According to Reuters, the United Nations acknowledged that it has a six-month backlog of projects with current staffing. If you are an investor or project developer and you want to create carbon credits through the CDM and you submit your proposal to the United Nations, then you have to wait six months – optimistically – to get your project credits approved. That is not six months to get the credits, but six months to find out if your project is eligible to generate the credits. This creates significant opportunity costs for project developers.

Historically, the CDM has had a structural bias against forests (see Figure 3). Questions have been raised about the ability to measure emissions reduction projects in developing countries. There have been concerns raised regarding local communities and environmental justice in that some of these projects reward large investors at the expense of local people. Not surprisingly, because of these concerns, the approval rate of forestry and agroforestry projects under the CDM has been abysmally low. The lack of approved methodologies for getting a forestry project through the CDM process is a great concern for investors looking to carbon markets to reduce tropical ecosystem deforestation rates. In response, parallel markets have been proposed such as the REDD market (Reduced Emissions from Deforestation and Degradation).

The lack of approved methodologies for getting a forestry project through the CDM process is a great concern for investors looking to carbon markets to reduce tropical ecosystem deforestation rates.

Figure 3 Kyoto Protocol CDM offsets by project type – share of volume (2007)

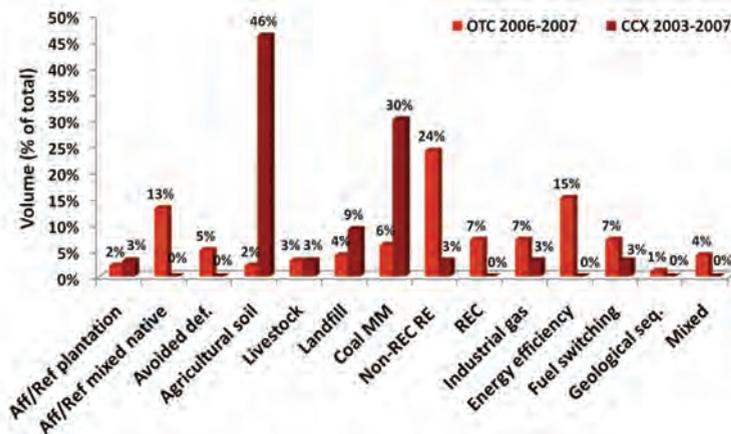


Voluntary markets

Forestry is more viable in the voluntary markets than it is under the compliance markets governed by the Kyoto Protocol (see Figure 4).

When we say voluntary markets, we mean a number of things. We know about the Chicago Climate Exchange, often referred to as CCX. Sometimes people think CCX is a compliance market because it is an exchange where entities sign up and pledge to reduce emissions, and engage in trading. Ultimately, however, there is no formal government-mandated cap-and-trade system backing the Chicago Climate Exchange, and therefore it is a voluntary market.

Figure 4 Voluntary market transactions by type



Prices in voluntary markets tend to be driven by factors other than supply and demand, or even the quality of the underlying project. This is largely due to the fact that participants in voluntary markets tend to get involved in projects as a way to demonstrate the environmental stewardship of the organization rather than to engage in a market transaction for some sort of investment return.

There are a lot of bilateral transactions in the voluntary market. A lot of carbon market trades happen between one buyer and one seller, or one group of buyers and one group of sellers. This system is fine except it tends to result in low transparency because there are no public exchange mechanisms to see those transactions occur. Prices in voluntary markets tend to be driven by factors other than supply and demand, or even the quality of the underlying project. This is largely due to the fact that participants in voluntary markets tend to get involved in projects as a way to demonstrate the environmental stewardship of the organization rather than to engage in a market transaction for some sort of investment return.

Since there tends to be low transparency in the voluntary markets, it is probably fair to say that these markets are a little bit of a “wild west.” Proponents of the voluntary carbon markets may insist that when markets are new, they may get a little crazy but will eventually sort themselves out. While this is a normal part of any new market’s development, the voluntary carbon markets are perhaps a little too “cowboy” driven, and there are a number of participants getting involved thinking that they are getting high-quality carbon credits while in fact they are not getting very much.

What is also interesting about some of the voluntary carbon market projects is that the delivery risk is on the buyer. For example, if you invest in a voluntary market forest project expecting to earn a return on those credits, it is possible that you may

lose the carbon credits if a fire or insect outbreak causes sequestered carbon to be released to the atmosphere. You would then have to make up for the lost credits somewhere else, such as on the spot market. This is an unusual characteristic, and people need to recognize that their carbon contract may be different from a traditional commodity contract where the seller bears the risk.

CHARISMATIC CARBON – FOREST CREDITS

Forests are charismatic. People like trees, and they like to invest in trees and see their carbon sequestered in trees. Trees are the charismatic megafloora of the voluntary carbon markets. They have enjoyed tremendous popularity as a result, which has encouraged policymakers to work through some of the methodological challenges created under the Kyoto Protocol. Kate Hamilton of the Ecosystem Marketplace has reviewed the voluntary carbon markets through a wonderful set of surveys that look at what motivates market participants. What you will find is that a lot of people are investing in the carbon markets in anticipation that once the United States passes federal legislation, their credits (which they assume they are getting at a discount since they are “voluntary”) may suddenly be worth much more in a compliance market. Others are investing in the voluntary carbon markets to get a feel for how these transactions work in expectation of compliance markets in the future.

Many participants today in the voluntary carbon markets are involved for external public relations purposes. This is not a bad thing – actually, it is a very prudent and cost effective branding exercise. Often they may participate out of a sense of corporate social responsibility, either externally perceived or internally driven. While this is a reasonable motivation, it is not a motivation driven by investment returns. This may create a disconnect between the quality of credits and the prices paid for them. If your whole goal is to look good, you are going to buy a project that makes you look good. The price you pay for it may not be that important because financial gain is not your ultimate goal. This has had an influence on prices paid for forest-based carbon projects. Some of the highest prices paid in the voluntary markets have been in forestry projects because they are very fashionable.

Forests are charismatic. People like trees, and they like to invest in trees and see their carbon sequestered in trees. Trees are the charismatic megafloora of the voluntary carbon markets.

FOREST CARBON PROJECT HURDLES – BASELINE, ADDITIONALITY, LEAKAGE AND PERMANENCE

As an investor in land, and someone thinking about whether or not to implement a forest carbon project, there are four hurdles to overcome independent of whether or not one is operating in compliance or voluntary carbon markets (see Table 1). First, a project developer must determine a baseline. What is the starting point against which incremental carbon will be determined? That may be a baseline year or it may be a stocking/vegetation baseline.

Second, and this is a particularly important issue for terrestrial carbon, projects must demonstrate additionality. The project is structured to generate credits, so it

must incrementally either sequester more carbon or avoid more carbon emissions than would have happened under a “business-as-usual” scenario, which may include the likelihood of emissions from future land use change. Additionality is critical, yet can be challenging, because forest carbon sequestration is complicated, both spatially and temporally. Demonstrating additionality on a project where there are carbon fluxes in and out of the system at different rates over time and from different processes can be very difficult.

Table 1 Four hurdles to forest carbon project establishment

Hurdles	
1.	Determine Baseline
2.	Demonstrate additionality
3.	Prevent leakage
4.	Ensure permanence

Once an investor can demonstrate a baseline, prove additionality, prevent leakage, and ensure the project’s permanence, then the investor must consider a number of other issues in deciding whether or not to monetize the carbon. Registering a forest carbon offset project is a time-consuming and very expensive process.

Projects must also protect against leakage. If carbon is sequestered on land that is taken out of timber production, it must not cause timber harvests to be redirected to another site. If this occurs, a project does not result in net carbon storage. Leakage is something that can be very difficult to track since forest products trade in global commodity markets. Some policymakers have proposed using Forest Stewardship Council (FSC) certification as a way to manage leakage although this may not protect against leakage outside the markets for certified wood.

Finally, project developers must ensure that the carbon they sequester is permanent. Permanence is a relative term since nothing is truly permanent in the sense of “forever” – there is nothing permanent in any biophysical process. Permanence, as defined by the market, is basically an assurance that carbon will be sequestered through land encumbrances which protect the trees from harvest if the carbon project developer sells the land. To address issues of permanence, many proponents of forest carbon offsets advocate the use of conservation easements as a way to protect the land. Easements are deeded protections to ensure that current and future investors and owners will not harvest or change the land use in a manner that is inconsistent with the forest carbon project.

THE CHALLENGES OF MONETIZING CARBON

Once an investor can demonstrate a baseline, prove additionality, prevent leakage, and ensure the project’s permanence, then the investor must consider a number of other issues in deciding whether or not to monetize the carbon. Registering a forest carbon offset project is a time-consuming and very expensive process, and often done with money that is paid upfront. Thus, a carbon project that requires significant capital commitments in the present for carbon streams in the future will have an income gap. This gap may or may not be a problem, given current cash flow needs or the investors’ required returns.

Crediting standards today are inconsistent. The standards have all types of different requirements for baseline, additionality, permanence, and quantifying the amount of carbon sequestered. These inconsistencies make it difficult for a land owner to know which standard to choose as transaction costs, and prices paid for credits under different standards can vary widely. For example, a forest carbon offset product that is Gold Standard-certified may sell at \$15 a ton. However, a landowner must consider how much it will cost to create a Gold Standard credit. Credit standards that have high transaction costs must offer final carbon prices that justify the cost.

Alternatively, choosing a less expensive standard may not always be more profitable. For example, it may be less costly to register credits under the Chicago Climate Exchange, but carbon credits on CCX sold for less than \$2 a ton two days ago. Added to this is the risk that one or more carbon credit standards may not be accepted under a U.S. federal cap-and-trade market, which further complicates the choice of which standard to use.

Another issue is that standards may have ancillary requirements that do not generate financial returns. Requirements to use native species and to preclude certain monocultures are one example. While the use of native species is beneficial for forest health, biodiversity, and wildlife, these benefits may not accrue to the investor. In this way, carbon credit standards may encourage investors to do something very good for ecosystem health but do not adequately compensate investors for that particular activity.

Another problem we are seeing more and more occurs when a carbon project owner is precluded from claiming multiple ecosystem services on the site. For example, a project that creates wetlands mitigation credits may have positive carbon benefits, but it is not clear whether landowners will be compensated for both benefits. Regulatory authorities may restrict multiple investments in ecosystem services on the same site to avoid claims of “double dipping.” This is an issue that is still in flux but has significant ramifications on the total return opportunities on a piece of land.

The risk that landowners do not receive compensation for the full benefits of their best management practices extends to agricultural projects as well. For example, conservation tillage is a popular carbon related management strategy. It reduces soil disturbance, which lowers net emissions, but it may also improve water quality due to reduced fertilizer use, limit the overall quantity of water required, reduce energy use, and help to prevent soil erosion. Carbon markets may or may not adequately compensate a farmer for the co-benefits that a particular project produces, which may thereby reduce the attractiveness of these management strategies.

Recently, we were meeting with one of our local partners in the southern U.S. and we asked him, “How would you characterize market competition?” Our partner’s response was, “You know, our biggest competitor is non-compliance. I can spend all this money putting a good project in the ground that has terrific ecological and functional uplift and restores wetland functioning. But if the guy down the street can get the same credits by doing it cheaply, cutting corners, and achieving fewer benefits, and if he can do it more quickly and get his credits sold before I sell mine, I will be out of luck for doing the right thing.”

There are also financial challenges for the landowner because transaction costs are very high. Since returns may be lower for ecosystem services projects than other projects, it may be simply more profitable to cut the wood. In particular, smaller projects tend to be uneconomic, which is a problem in North America where there may not be sufficiently large tracts of land to achieve economies of scale. Carbon projects require a certain amount of fixed cost that is difficult to spread over smaller parcels, and there may be conflicts or tradeoffs with other goals. If land is encumbered for carbon, it may preclude generating incremental timber income or implementing a wetland mitigation bank that could yield higher returns.

The challenge for credit buyers is that the carbon sequestration process in forests is complicated. Professors Mark Ashton and Xuhui Lee gave a great seminar last semester at Yale that explored the current state of science in carbon sequestration. Yale will be putting out a publication from this seminar, which I encourage everyone to read.⁷

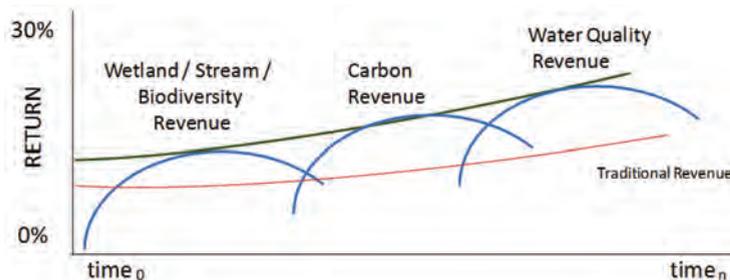
In addition, transparency can be very low. Buyers may not know what they're getting. If their motivation is a press release, it may not matter, but to a financial investor, it certainly does matter.

At the same time, there is limited ability to manage risk. Delivery failure, which occurs when a carbon project fails to achieve its expected rates of carbon sequestration, is difficult to hedge in today's market. While one can buy an insurance contract, they are very expensive. Since many market participants in today's voluntary carbon markets are driven by motivations that are not purely financial, prices paid for carbon do not always adequately reflect their risk.

RETURNS FROM ECOSYSTEM SERVICES

The following chart encapsulates how Working Lands characterizes current markets for ecosystem services (see Figure 5).

Figure 5 Ecosystem services market development

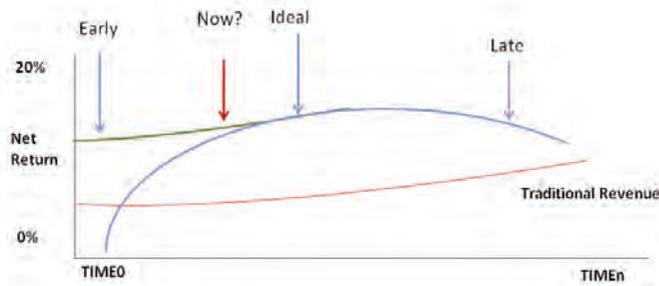


The lower line depicts traditional revenue from timber and recreational leases while the upper line is the added return that one might realize from the addition of ecosystem services. We tend to look at the underlying ecosystem services in various stages of development. Essentially, this chart shows that markets are not very interesting at the beginning, particularly in relation to traditional income from timber. As these markets develop, however, and as you move up the curve, there is

greater potential to generate higher returns. As markets mature and become increasingly efficient, there will be deflationary pressure in returns. Today, we tend to look at wetland and stream mitigation as being further developed than both carbon and water quality markets.

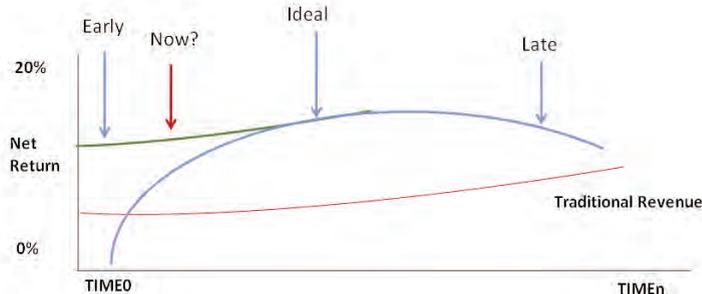
Based on our project experience, we believe the wetlands mitigation market is very attractive (see Figure 6). The regulations are clear and acceptable. They cover both the supply and demand side of the transaction, and the delivery risk is on the supplier. Some inefficiencies remain, however, and volume and pricing are not transparent and transactions continue to be bilateral. Nonetheless, we believe that the risks associated with this market are consistent with the types of returns one can realize.

Figure 6 Wetlands mitigation market development



We believe that carbon markets require a bit more development before they are viable investment options (see Figure 7). We recognize that voluntary markets, as exciting as they are, have some structural and credibility challenges. This is entirely appropriate since the market is progressing forward to what is hoped will be a federal compliance market. The standards are developing and aggregators are emerging and putting together carbon portfolios. This bodes well for creating scale. Delivery risk, however, is still uncertain. Moreover, projects are so heterogeneous that they are difficult to compare. One really has to closely examine some very complicated prospectuses in order to understand the timing, cash flow, pricing, and risks associated with the particular project.

Figure 7 Carbon market development



As markets mature and become increasingly efficient, there will be deflationary pressure in returns. Today, we tend to look at wetland and stream mitigation as being further developed than both carbon and water quality markets.

AN INSIDE LOOK AT A PROJECT – WHAT IS THE ROLE OF FOREST CARBON OFFSETS?

I will run through a sample project from an investor perspective. This is a project in the southern United States that is just under 10,000 acres. Parts of the land were previously owned and managed by a timber company. It is a small property that includes pine plantations and mature hardwoods, some wetlands, several existing structures, a nice stream, and a well-built road system. It is strategically placed in the mitigation market and has a lot of potential for wetlands mitigation.

This property is an amalgamation of a lot of individual land purchases that were completed by an institutional owner over the last few decades. As part of our due diligence process, we divided the property into sections. Sections were determined based on site quality, current land use, productivity, and potential productivity based on optimal land use. We then modeled different management scenarios for the parcel.

To give an example of our approach, we segregated a parcel across a busy road near a suburban area. Since this parcel was really non-core to the rest of the property, particularly from an ecological perspective, we determined it might be attractive for traditional development. Its small size lent itself to very few land use choices, including timber. But its strategic location on the main road suggested that its highest and best use was indeed traditional real estate subdivision and development.

Since this region of the country tends to be flat, the small mountain on the property might lend itself to some limited development. As an organization, we do not consider development activities to be a core part of our strategy nor a part of our broader goal of managing long term working landscapes. However, carving out a few lots in this area of the property (which includes lake views) would generate significant cash flow while keeping the overwhelming majority of the property as open space.

Figure 8 Sources of return for the sample project



Figure 8 gives a sense as to how we modeled the parcel. We believe that there is about \$11 million in net present value for the timber. That is the value of the standing timber using a very modest harvesting schedule that does not assume any extra sales to generate income earlier nor that the timber will move into a higher quality class and bring a higher price if we hold onto it. We would get a nice income from recreation, which is a very low-risk activity whereby we basically lease out the property to hunters. There would be some insurance costs associated with this, but the great thing about leasing to hunters is that you generate income from people on your land who are effectively stewarding your land by preventing poaching, dumping, and all types of undesirable activities.

Mitigation is a big driver for this project. We have preliminarily set aside 2,000 of the 10,000 acres for mitigation. We assume it will cost about \$1.5 million to build out the mitigation bank, and we assume that we will not sell any of the credits until year three. We will actually have the mitigation credits, but rather than selling them immediately, we will release them evenly over time. We are being very conservative on our cash flows and, as a result, we believe mitigation credits will generate about \$12 million in net present value.

We are also considering development of some ranchettes, which are anything from 2 to 49 acre lots. I think most folks would consider that fairly light. Our estimates assume that we sell these ranchettes at below-market prices. This development would yield about \$2.5 million in net present value spaced throughout the project.

Finally, we assume nothing for easements. We initially thought we could sell an easement, which would allow us to receive cash flows up front, but there remained the question of who would buy the easement. In this region there are no land trusts, and many local residents do not like easements.

That said, we believe that if we bought the land for cash – no leverage, no debt, no mortgage – we could earn an internal rate of return of 24 percent. The investor would be able to get full return of capital plus a hurdle in year eight. If we issue some debt in order to pay for this acquisition, the internal rate of return jumps dramatically. Now, if we sell the mitigation credits early, say, for example, we sell them all out in five years, then the rate of return jumps to 64 percent and the investor gets money back plus hurdle rate in year three. However, if we extend the period of time over which we sell the mitigation credits or if the market for mitigation credits is weak, our rate of return falls to 28 percent (with leverage), and the investor again has to wait six years to repayment (see Figure 9).

It is very important to think about the timing of cash flows for an investment, particularly with carbon. Carbon payments do not always accrue immediately to the investor.

Our analysis projects this sample project to be cash flow positive in year two. The mitigation bank is very attractive, with much of the \$1.5 million upfront costs covered by credit sales. It is also important to note that no single activity is driving overall project returns. This is important because you do not want to have all your eggs in one basket. The structure of this project also gives us the flexibility to expand the

Renewable energy is a relatively small portion of the carbon offsets in the United States. Additionality can be very difficult to establish with renewable energy projects, especially if the offsets occur in a state that has a renewable portfolio standard or another policy that provides incentives or requirements for utilities to fund renewable energy. In these cases, it is difficult to say that these carbon offsets would not have happened anyway and that they are above and beyond business as usual.

mitigation bank to 4,000 acres, because we have not encumbered the land for other purposes.

Figure 9 Sample project returns



It is very important to think about the timing of cash flows for an investment, particularly with carbon. Carbon payments do not always accrue immediately to the investor.

So, what happened to the carbon? In fact, there is no carbon in our investment model. We built out the sub-model for carbon, and ran all kinds of scenario analyses. I think ultimately the decision to forego carbon sequestration came down to the fact that we did not want the hassle. The management requirements for additionality were too cumbersome. Part of it was due to the fact that a lot of the wood was mature and ready to be harvested. There would not have been much to gain by extending rotation cycles. We thought about reforesting the feed plots (areas cleared for deer hunting) because fallow land that gets reforested can be a very attractive carbon project. But the feed plots were not contiguous and were not of sufficient scale to warrant reforestation. When we looked at the cash flow projections, the amount of cash outflow early in the project relative to the inflow later was not attractive, particularly given the restrictions it would place on us.

And so, the question to ask becomes, is carbon sequestration a superior management goal given all the other priorities and needs of the investor or landowner? It is important to note that a number of the investors and landowners we talk to are not concerned with global warming. Thus, there is a real need to demonstrate the financial benefits of carbon in its own right without simply voicing a responsibility to mitigate climate change in the markets where we operate. We are not in areas where people live next to wildlife refuges or areas that the conservation organizations love to protect. We make investment decisions driven by risk and return. And in that way, we have to ask if terrestrial carbon credits are a superior investment given other types of environmental credits available. Maybe, maybe not.

CONCLUSION

Despite the fact that I did not advocate for forest carbon markets in this example, we do believe that the ecosystem service markets are more of a “when” than an “if.” We

continue to look for opportunities to develop ecosystem services, even in carbon. Fundamentally, we believe our most important goal is to develop clear management objectives and sound stewardship plans.

Lands can have a mosaic of activities, and that mosaic may yield very strong investment returns. The diversity of income sources can also be a terrific risk management tool that may ultimately result in ecological benefits that managers would not have been able to achieve if they were managing for any one particular ecosystem service, such as carbon. It is really important to consider full net benefits, not simply carbon benefits. This makes sense both from an ecological and a financial perspective.

We recognize that the carbon market is in flux. There is tremendous volatility. Volatility can be good or bad, depending on which side of it you are on. We always look for opportunities that are consistent with our underlying goals, which are returns with a conservation overlay. It is important to understand the tradeoffs. If you encumber the land for carbon, you lock it up. If you change your mind, there are consequences associated with that decision that may not be financially attractive.

Ultimately, we seek to implement comprehensive stewardship plans that may or may not include mitigation or carbon. We do expect our projects to generate returns and create some sort of functional uplift in the underlying ecosystem. We hope to pick our point of entry and have realistic expectations for returns. I would argue that in some areas of the carbon markets, return expectations are not yet realistic.

Going forward, we will watch the development of crediting standards. We would like to see more clarity in those standards. We would also like to see the emergence of a secondary market that would give us some liquidity for trading and pricing signals. We would like to see the creation of risk management tools that are not unreasonably expensive, and we would like to see the regulatory agencies somehow create a balance between preventing double-dipping by land owners and creating too many subsidies.

Subsidies are effective long term, but regulators must ensure that there is enough flexibility for land owners who have multiple opportunities on their land to engage in those opportunities and take advantage of the subsidies and markets that are available. And, of course, we would like to see improved transparency. As an investor, our goal is ultimately to maximize returns under a given level of risk. We are not afraid to take risk in the ecosystem services markets. We just want to be compensated for those risks.

Question & Answer Session

QUESTION 1: Breakdown of voluntary markets for biological sequestration

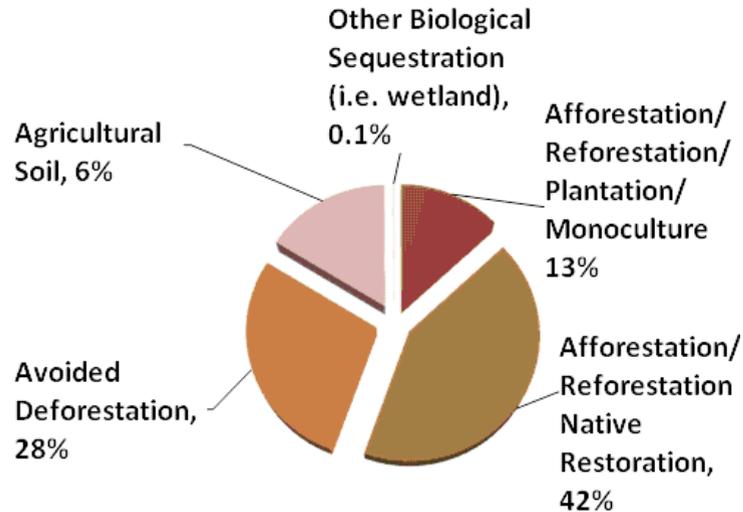
You noted that agricultural soil credits accounted for 46 percent of Chicago Climate Exchange (CCX) markets. Is that low hanging fruit or is that the charismatic carbon you alluded to with the forestry market?

And so, the question to ask becomes, is carbon sequestration a superior management goal given all the other priorities and needs of the investor or landowner?

More than anything else, I think that is a result of data mining and the way the data is presented. I would point to a couple things. First, this was the first year that this report included soil carbon in the numbers. If you look at the chart from the year before, it shows agricultural soil at zero and avoided deforestation at 33 percent. This creates large fluctuations. Plus, the markets are still really small. If you have one big transaction, then it distorts the market share of the carbon project type and may lead you to conclude more is going on than what is happening in reality.

Here are some statistics. If you look at all biological sequestration in the voluntary markets today, 13 percent of it is afforestation or reforestation of monoculture; 42 percent is afforestation or reforestation of native species; 28 percent is avoided deforestation; 16 percent is agricultural soil; and 1 percent is other.

Figure 10 Biological sequestration in voluntary markets



Despite the fact that I did not advocate for forest carbon markets in this example, we do believe that the ecosystem service markets are more of a “when” than an “if.”

QUESTION 2: Role of insurance to ensure premium price in the voluntary market

Can credit suppliers provide any sort of insurance or risk management, like a credit reserve pool, to provide a price premium for forests in the voluntary carbon markets?

I know that CCX has a reserve margin of 20 percent on their forestry projects. That is obviously not showing up in a price premium, which is probably because prices for the credits are driven by other factors. My sense is that there is not enough data available to have a statistically significant answer to that question. If you read the *State of the Voluntary Carbon Markets* report,⁹ sometimes broad conclusions are drawn on five data points. Because so many of these transactions lack transparency, it is really hard to know what is embedded in the credits, what you are paying for, and what

reserves or insurance measures are actually in place. In the CDM market however, some of these features are being explicitly recognized.

Do you mean the TCERs (Temporary Certified Emissions Credits), GCERs (Guaranteed Certified Emissions Credits), and the ICERs (Insured Certified Emissions Credits)?

Yes, exactly. Those credits are more likely to be appropriately priced, leading to a discount in the case of temporary credits and a premium in the case of guaranteed credits. My guess is that if there is a compliance market in the United States, CDM prices will likely translate directly into the market price. That said, I suspect that there are other drivers of the price that make it difficult to tease out the types of risk premiums or price premiums that are paid for adequate protection. If I were constructing a portfolio and had to make some assumptions about price premium, I would use the GCER and the ICER prices as a proxy.

If you look at the regulations that are being developed (i.e. CCX's required reserve pool) and dictating how investors should manage risk, and given that there are not really any insurance options in the market right now, what is the role of the regulator? Should the market price reflect the risk?

Coming from the financial community, I tend not to like regulators or governments that overly influence how a market functions or prices assets. However, when you have a new market, you have structural challenges and need government regulation to create proper infrastructure that allows prices to reflect risks and allows for proper risk management within a market environment.

It sounds contrary to my own philosophy, but I think right now the lack of regulation in the carbon markets is a key problem. I do not necessarily think regulators should be in the role of managing risk because the markets will price that. But right now it is such a free-for-all, and things change so quickly, that what we see today may or may not exist tomorrow. As soon as a risk manager like an insurance company or a derivatives player sees the opportunity to make money by offering risk management tools, the market will take over that function. As more avenues develop for hedging risk, the price of risk management will decline because of competition. So I do not worry about it too much.

As an investor, our goal is ultimately to maximize returns under a given level of risk. We are not afraid to take risk in the ecosystem services markets. We just want to be compensated for those risks.

QUESTION 3: Breakeven price and demand for international forestry credits

You mentioned that you are willing to take risks as long as you are compensated. Do you have any sense of those risks, given the carbon prices you are seeing in the market?

I have consulted on a couple of projects, and the breakeven price is dependent on the project type, which in turn is largely driven by the underlying species type, site, and sequestration rate. An article I read noted that the clearing price for avoided deforestation credits in developing countries is US\$5 a ton, but most of the projects that I have looked at have been closer to \$12 a ton.

What are you seeing as far as demand for international forestry credits, as opposed to U.S. credits, in the voluntary and compliance markets? Where do you see the voluntary and compliance markets going with demand for international forestry credits relative to the U.S. market?

As a parallel to the Kyoto Protocol, the REDD (Reduced Emissions from Deforestation and Degradation) market was proposed to address the lack of flexibility in forest carbon crediting under the CDM. Right now there are pilot REDD projects from avoided deforestation in place, financed by HSBC and the World Bank. We will have to wait and see how these perform. There has been a recent backlash in developing countries on the REDD credits because the methodologies for determining the baseline and additionality are spurious. There are some discussions about using a country's normal deforestation rate as the baseline; a project would receive credits to the extent actual sequestration exceeds the baseline level. Advancements in remote sensing technologies have the potential to improve on the United Nations Food and Agriculture Organization's data, but until those issues are resolved, my bet is that the market for international forestry credits is going to move in fits and starts and be very slow to develop.

However, when you have a new market, you have structural challenges and need government regulation to create proper infrastructure that allows prices to reflect risks and allows for proper risk management within a market environment.

QUESTION 4: Role of NGOs in forest carbon market development

I have a question about the kinds of players you see in the market. I worked on a carbon offset project involving a small collaboration of NGOs (Non-Governmental Organizations) in southwestern Australia and found it to be a disorganized process. Are you seeing any trends in NGOs being able to enter the market successfully, or is it really dominated by larger players?

Right now I think NGOs are playing a very key role in this because they are supplying a lot of the capital, generating a lot of interest, and bringing together large institutional players. We specifically try to stay away from competing with NGOs since they often have a lower cost of capital when making land investments. Plus, we are looking at lands that do not typically excite NGOs. Some of these lands are too small for the large conservation organizations, and that, we feel, gives us an opportunity to find land at attractive prices. Quite frankly, many times we encounter people who culturally do not trust NGOs or government agencies because they do not want to be told what to do

QUESTION 5: A compliance market for forest carbon in the United States

Will there be forest carbon offsets in an upcoming U.S. climate cap-and-trade system?

The consensus is yes, but the question is whether managed forests will be allowed. If California takes the lead, there will be a lot of flexibility in allowing forest products or various forest project types. I think what is undetermined is the role of harvested forest products in a U.S. carbon market. I wouldn't venture to guess on that. I have worked on a project, though, where the only way the project worked financially was

to include harvested long-lived wood products in the carbon accounting. Otherwise it would not have been economically viable. We presented it to a local authority which was sympathetic with the methodology. However, as you can imagine, accounting for forest products and determining credit recipients is very complicated.

Lessons from the Voluntary Forest Carbon Markets: Applications to Emerging Compliance Markets

Bradford S. Gentry (*Moderator*)

Director, Center for Business and the Environment at Yale

Edwin Aalders

Director, International Emissions Trading Association

Edwin Aalders has held the position of Director of the International Emissions Trading Association (IETA) since 2004, and of Acting CEO of the Voluntary Carbon Standard Association since 2007. At the IETA, Mr. Aalders was responsible for the UNFCCC process, such as the CDM and JI as well as the voluntary market. He has acted as an elected member of the JI Accreditation Panel and is currently on the roster of experts for the Methodology & Accreditation Panel of the CDM. Since joining IETA, Mr. Aalders has attended key negotiations on Climate Change both in relation to the EU ETS as well as the CDM Executive Board and the Joint Implementation Supervisory Committee and represented the business perspective at international climate change conferences. Mr. Aalders holds an Engineering degree in Tropical Forestry from the Larenstein International Agricultural College in Velp, Netherlands, and a Masters in Forestry from the University of Oxford.

Katherine Hamilton

Associate Director, Ecosystem Marketplace

Katherine Hamilton is the Carbon Project Manager at Ecosystem Marketplace. Prior to this, she earned a Masters degree at the Yale School of Forestry & Environmental Studies, where she focused on corporate environmental management and carbon markets. Ms. Hamilton is an expert in the voluntary carbon markets and recently published "Voluntary Carbon Markets: A Business Guide to What They Are and How They Work." Before attending Yale, she worked at Natural Capitalism Inc. and with the International Council for Science in Paris. Ms. Hamilton received a B.A. in International Relations from the University of Michigan.

March 25, 2009

4:00 to 5:30 p.m.

Burke Auditorium, Kroon Hall

195 Prospect Street

Chapter 4

Lessons from the Voluntary Forest Carbon Markets: Applications to Emerging Compliance Markets

Edwin Aalders

Director

*International Emissions Trading Association**

Katherine Hamilton

Associate Director

*Ecosystem Marketplace***

This chapter reviews the voluntary carbon market and provides context in which to better understand trends, barriers and opportunities for forest carbon markets. A recent growth in new standards in the United States highlights the emerging role forests can play in a national climate regime. These standards highlight the variety of methodologies and factors currently being used to assess forest carbon projects. The authors also provide the context of the stakeholders involved in influencing policy decisions that will determine whether forest offsets are included in U.S. climate legislation.

* For more information on the International Emissions Trading Association, please go to www.ieta.org

** For more information on the Ecosystem Marketplace, please go to www.ecosystemmarketplace.com

INTRODUCTION

Katherine Hamilton

Ecosystem Marketplace is a non-profit organization and a project of Forest Trends. We focus on gathering news, data, and analytics on environmental markets and payments for environmental service transactions. These transactions are now happening across the globe but are highly fragmented and opaque. We post daily news covering different markets, and collect data and run analytics on the markets to identify trends. To increase transparency and access to information, all of the data and information is free and online at www.ecosystemmarketplace.com.

We launched a new website in January, *Forest Carbon Portal*, that is completely dedicated to forest carbon. It has the same model as our main site – news, data and analytics – but is focused completely on forest carbon.¹ One of the most unique parts of the site is that we track projects that are actually selling credits into the market. Despite all the policy and market discussion surrounding forest carbon, there was no central place where people could go to see a description and transaction information for active projects, particularly in the voluntary markets. Available project information in voluntary and pre-regulatory markets is scarce, and different reporting requirements and standards can make it seem like comparing apples to oranges. The Forest Carbon Portal allows users to access data and compare forest carbon projects across markets, standards, and countries. The site does not rate projects. We try to create as much consistency as possible in order to get the information out there so that people can understand and judge the projects and associated credits on their own.

¹ www.forestcarbonportal.com

VOLUNTARY MARKETS AND FOREST CARBON

In addition to tracking forestry projects, Ecosystem Marketplace also tracks the Voluntary Carbon Markets (VCM) overall across project types. Although they make up just a fraction of the total carbon allowance and offsets markets, we think these markets are quite significant. There are two segments to the voluntary carbon markets: the Chicago Climate Exchange (CCX) and the over-the-counter (OTC) market. CCX is an organized, U.S.-based, voluntary cap-and-trade system that has its own standards and rules. The OTC market is really everything else; it includes credits defined by many different standards. Figure 1 illustrates the size of the various carbon market segments. The OTC market should really be a splatter rather than a circle, since the credits that trade are not uniform.

Figure 1 Relative size of carbon market segments 2007²



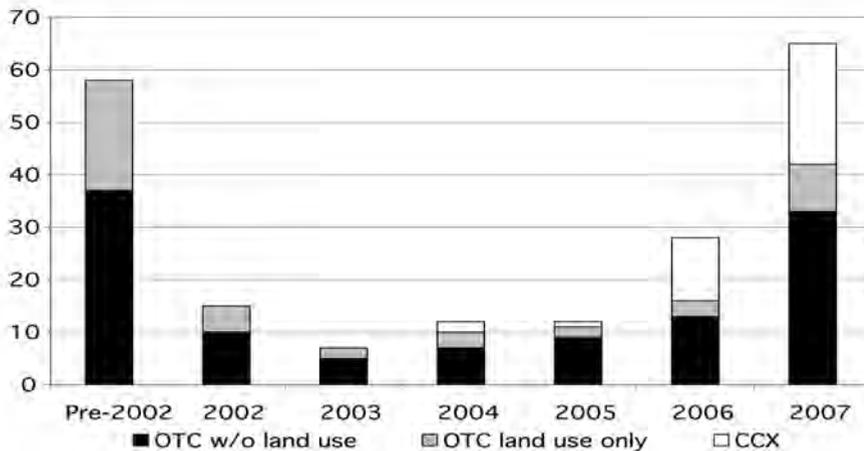
² Source: New Carbon Finance and Ecosystem Marketplace

Ecosystem Marketplace tries to track both of these segments in our report, “State of the Voluntary Carbon Markets.”³ The third annual market report was released in May of 2009. Figure 2 shows how the voluntary market is divided between the two primary markets, CCX and OTC, as well as the share of the OTC market that is made up of land use projects.

Forestry made up a significant portion of the voluntary market prior to 2002 -- some of the earliest projects in the carbon markets were forestry credits. However, the market has become more diversified over time, with forestry making up a decreasing share of the total credits transacted. In 2007, for example, land-based projects made up only 18 percent of the OTC market. Figure 3 presents a further breakdown of 2007 land use offset projects in the OTC market, by type. In 2007, forestry clearly dominated among land use projects, with native species afforestation and reforestation making up nearly half of total recorded transactions.

In the Chicago Climate Exchange, there was a surge of interest in forestry in 2008. It is difficult to get information on exactly what types of offset credits were sold, but offset registration data indicates that forestry project and credit registration soared in 2008. Total forestry offsets registered went from about 600,000 metric tons of CO₂ equivalent in 2007 to over 6.9 million metric tons in 2008. Managed forests made up the majority of the growth.

Figure 2 Voluntary carbon markets: size and growth in 2007⁴



Source: Ecosystem Marketplace and New Carbon Finance. In Figure 2, please note that: (1) CCX portion accounts for all credits transacted; (2) “land use” includes agricultural carbon.

It is interesting to note that the voluntary OTC and CCX markets make up a significant source of forest carbon within the broader carbon market. Under the Clean Development Mechanism (CDM), the Emission Reduction Purchase Agreements (ERPAs) were signed for roughly 3 million metric tons in 2007, compared to a total of 6.6 million metric tons CO₂ in the OTC and CCX markets. No forestry credits have been issued under the CDM. We do not have complete data for 2008 yet,

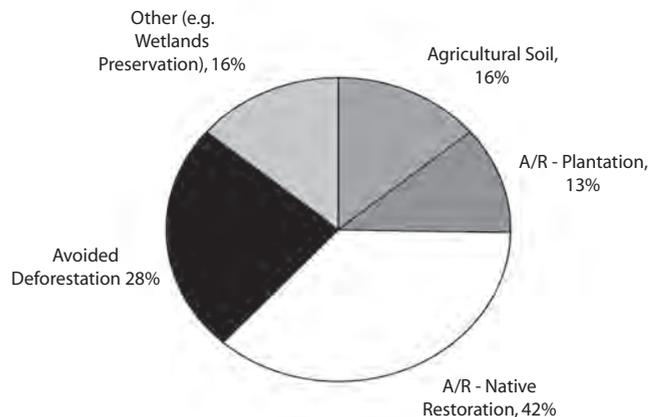
³ Download *State of the Voluntary Carbon Markets 2008* at www.ecosystemmarketplace.com

⁴ Ecosystem Marketplace and New Carbon Finance (NCF), 2008

In 2007, forestry clearly dominated among land use projects, with native species afforestation and reforestation making up nearly half of total recorded transactions.

but it looks as though CDM trading remained fairly constant at 3 million metric tons CO₂, and trading on CCX surged as described above. So, while the voluntary market is only about 2 percent the size of the regulatory markets in terms of valued transacted, there are actually more forestry credits sold on the voluntary OTC market and on CCX than there are in all of Kyoto.

Figure 3 Recorded OTC transaction of land use offsets 2007



Source: *State of the Voluntary Carbon Markets*, 2008, available at www.ecosystemmarketplace.com

At CXX, total forestry offsets registered went from about 600,000 metric tons of CO₂ equivalent in 2007 to over 6.9 million metric tons in 2008. Managed forests made up the majority of the growth.

There are a couple of different reasons for this and I think they vary across the range of voluntary markets – pure voluntary versus pre-compliance voluntary versus the Chicago Climate Exchange. First, there are a lot of hurdles for Clean Development Mechanism project enrollment that just do not exist in the voluntary markets. The voluntary space, therefore, became a more practical place to develop a project. As a result of the less standardized structure of these systems, the voluntary markets have become sort of a playground for innovation and testing of new standards and methodologies. The increased flexibility of the pure voluntary market, in particular, has created a big demand for what is often called “charismatic carbon.” This refers to carbon sequestration with a story. Forestry often has a marketable story behind it, and it is easy for consumers to understand forest-based carbon credits. Such projects have evolved since they were first marketed in the European Union, when early forest carbon was sort of an “ugly duckling.” In many ways, I think voluntary forest carbon has become a swan on the U.S. scene.

The relatively free-form structure of the voluntary markets is itself one of the reasons why trading has blossomed, but this flexibility is not without drawbacks. Arguably the most contentious issue for forest carbon in the voluntary market – and the voluntary market as a whole – has been standards. Standards are, of course, critical: it is the standard that creates the credit and dictates what can be transacted in the market. A common affront to voluntary forest carbon credits is that they are not legitimate offsets because of a lack of standardization across the pure, pre-

compliance CCX voluntary markets. The lack of standardization applies to the pure voluntary market in particular, where there are not really rules that ensure that a legitimate credit is created and sold because the market is, almost by definition, undefined. A number of different actors have been digging into this issue, discussing how to create these rules.

STANDARDS

There are a number of different standards out there for the voluntary markets, but they can roughly be divided into two categories. One category might be called the charismatic carbon standards. This category includes those published by the Climate, Community and Biodiversity Alliance as well as The Gold Standard, a voluntary market organization that brands credits based on sustainable development benefits. At this time, The Gold Standard does not include forestry projects.⁵ Such charismatic carbon standards take into consideration factors beyond actual sequestration, such as the local social impacts of carbon projects.⁶

The second category of standards is the commodity standard. This category includes the Chicago Climate Exchange's rules, the Voluntary Carbon Standard, the State of California's Climate Action Reserve protocols, U.S. Environmental Protection Agency Climate Leaders guidelines, the American Carbon Registry's standards, and Germany-based TÜV SÜD's VER+ standard. These are the standards that are geared toward pre-compliance. Purveyors of these standards are now looking at U.S. federal legislation to see how they can influence what will ultimately become the offset standards for U.S. climate change regulation. Several standards are actively positioning for the compliance world. The Voluntary Carbon Standard, for example, based its new offices not in Geneva, which is home to a number of carbon market organizations, but in Washington, D.C. What was formerly known as the California Climate Action Registry Standard has recently re-branded itself as the Climate Action Reserve Standard, a name more in line with its aspirations to become the pre-compliance standard for the entire U.S. market. The American Carbon Registry called its new standard for forest carbon a "pre-compliance standard" in its press release.

I think this positioning makes a lot of sense. The U.S. climate change legislation that has circulated thus far contains significant details regarding the inclusion of offsets – and forest-based offsets in particular – in a national regulatory regime, as well as some basic project eligibility standards. Figure 4 presents some of the language from the Lieberman-Warner Climate Security Act of 2008 that references forest carbon and lays out some basic eligibility guidelines. This is very different from how forest carbon was treated when the European Union drafted its climate change policy; forestry credits are not allowed into the EU Emissions Trading Scheme.

U.S. ACTIVITY IN FEDERAL CLIMATE CHANGE POLICY

March (2009) has been a big month in Washington, D.C., for climate legislation. The past couple of weeks, many Yale School of Forestry & Environmental Studies alumni

⁵ The Gold Standard Marketing Director, Jasmine Hymin, discusses how The Gold Standard's social considerations might factor into forest carbon crediting in the future in Chapter 5.

⁶ The Gold Standard: www.cdmgoldstandard.org, The Climate, Community & Biodiversity Alliance: www.climate-standards.org

The voluntary markets have become sort of a playground for innovation and testing of new standards and methodologies.

have been working late as they become involved in a variety of bills. The biggest one right now is the Waxman-Markey bill, which is supposed to come out as a draft version of the legislation at the end of March.⁷

⁷ Representative Henry A. Waxman, Chairman of the Energy and Commerce Committee, and Representative Edward J. Markey, Chairman of the Energy and Environment Subcommittee, released a draft of the American Clean Energy and Security Act of 2009 (ACES) on March 31, 2009. The House of Representatives passed an amended version of the bill on June 26, 2009.

Figure 4 Sections of S. 3606 (Lieberman-Warner Climate Security Act of 2008)

Subtitle D: Offsets

SEC. 2403. ELIGIBLE OFFSET PROJECT TYPES.

(b) Categories of Eligible Offset Projects- Subject to the requirements promulgated pursuant to section 2402(b), the types of operations eligible to generate offset allowances under this subtitle include—

- (2) changes in carbon stocks attributed to land use change and forestry activities limited to—
- (A) afforestation or reforestation of acreage not forested as of October 18, 2007; and
 - (B) forest management resulting in an increase in forest stand volume;

SEC. 2408. TIMING AND THE PROVISION OF OFFSET ALLOWANCES.

(b) Pre-Existing Projects-

- **IN GENERAL** – The Administrator may allow for the transition into the Registry of offset projects and banked offset allowances that, as of the effective date of regulations promulgated under section 2407(a), are registered under or meet the standards of the Climate Registry, the California Action Registry, the GHG Registry, the Chicago Climate Exchange, the GHG CleanProjects Registry, or any other Federal, State, or private reporting programs or registries if the Administrator determines that such other offset projects and banked offset allowances under those other programs or registries satisfy the applicable requirements of this subtitle.
- **EXCEPTION** – An offset allowance that is expired, retired, or canceled under any other offset program, registry, or market as of the effective date of regulations promulgated under section 2407(a) shall be ineligible for transition into the Registry.

Different advocacy groups are drafting language to include in the Waxman-Markey bill. I was reading language from the Carbon Offset Providers Coalition while I was on the train today, and I thought it was really interesting that they have included huge chunks of language on agriculture and forestry. Avoided Deforestation Partners is another group working to get this language into the legislation.

Those interested in climate change policy are also watching another important development, the Safe Markets Development Act, which was just announced this week.⁸ Texas Representative Lloyd Doggett introduced this bill to allow the Internal Revenue Service to collect revenues from a potential government auction of greenhouse gas emission allowances, to set up a registry and allowance transfer and tracking systems, and to allow the administrative board overseeing the carbon market to forecast and potentially moderate price volatility in the carbon market. People in the cap-and-trade world were also excited about President Obama's inclusion of revenue from a potential greenhouse gas emission allowance auction in the federal

⁸ H.R. 1666, The Safe Markets Development Act, was referred to House Energy and Commerce on March 23, 2009.

budget. There is a lot of movement right now in U.S. climate change legislation in general and, more specifically, in the development of standards and forestry offset projects.

SUMMARY OF THE TRENDS

A number of key trends have emerged in the past 12-18 months that will impact U.S. climate change policy and forest carbon, in particular. First, U.S. – and, potentially, future global – forest carbon standards will not be modeled directly on the Kyoto Protocol’s CDM rules. While copying those standards may seem easier than developing new ones, a sufficient number of criticisms have been cited in those standards and in the crediting process as a whole that policymakers are looking for new examples. Those new examples are and will continue to be the standards developed for the voluntary markets, and the commodity standards in particular.

Secondly, there is a lot of popularity for standards that are already government-sanctioned. For example, the Climate Action Reserve Standard’s endorsement by California’s Global Warming Solutions Act (also known as A.B. 32) has been a huge plus for that standard in terms of positioning it as the pre-compliance standard. Likewise, U.S. EPA’s Climate Leaders program released an offset standard and is seen as a boon to projects using it.

Third, U.S. policymakers seem to be leaning toward using performance-based, rather than project-based, standards. The CDM uses project-based standards, and this has been perceived as one of the factors encumbering the CDM process.

Finally, as I mentioned earlier, there are strong agricultural and forestry constituencies in this country that will make their desires known. The agricultural sector, in particular, will continue to receive significant attention on the offsets front.

U.S. policymakers seem to be leaning toward using performance-based, rather than project-based, standards.

STANDARDS IN FOREST CARBON

Edwin Alders

There are two things I would like to add to Kate Hamilton’s discussion of the role forestry has played in the voluntary markets, both historically and in the present. Prior to 2002, forest carbon played a significant role in the voluntary carbon market because the projects were easy to sell. Buyers could understand the concept of forestry offsets because it was visible, involving tree planting or forest conservation. This provided incentives for a lot of forestry project developers. However, the rest of the industry was not interested in the voluntary market. It was something for greenies, and something the industrial sector wanted to delay for as long as possible.

Then, early in the 2000s, international negotiations including the Marrakech Agreement delineated forest project eligibility requirements. While afforestation and reforestation projects would be credited, all other types of forestry projects were not eligible for sequestration credit in the compliance market. This killed about 75 percent of the voluntary market. Those people whose projects turned out to be

ineligible for the compliance market saw their prospects fall. As someone who did verification for many of the earlier, pre-2002 forestry projects, I am now seeing a resurgence of the discussions we had 10 or 15 years ago.

Voluntary markets are, in essence, about showing that your organization and your projects are good, and that they have value. Kate mentioned that the voluntary markets can be “pre-compliance” markets for polluters. They function as a venue in which polluters can demonstrate to regulators and other stakeholders that they are being proactive in mitigating their greenhouse impacts. Of course, this may be done as a not-so-subtle suggestion to recognize these activities when it comes to imposing formal regulation. This applies to offset project owners as well as polluters. In order to convince people that what you are doing is right, you must use accepted standards. What Kate discussed is only a sampling of the standards in use today.

The compliance markets, on the other hand, are purely about compliance. Credits in the compliance market are clearly defined – a credit is a credit, an allowance is an allowance, and there is no argument about it. Those entities emitting greenhouse gases may be buyers or sellers, as defined by the rules of the program and allowance allocations.

Defining “worthy” carbon credits outside of the compliance market, therefore, has proven to be a complicated task. When my organization, the International Emissions Trading Association (IETA), was originally approached to hash out the Voluntary Carbon Standard (VCS), there were already a number of claims on what a forest-based carbon credit *should* be. There was actually very little understanding, though, about whether those credits constituted legitimate carbon sequestration. I would like to see a “gold standard” credit that incorporates social as well as environmental benefits, but we have to be sure that carbon is actually being sequestered.

The legitimacy of an actual Gold Standard offset project is easy to understand because it is a CDM project at its core, with social aspects added on to earn Gold Standard branding. Other programs, for example Social Carbon, are not able to provide the same level of assurance for the environmental aspects of the project because the carbon accounting does not use a properly verified methodology. Buyers in both the voluntary and compliance markets want to be confident that what they are buying is indeed a carbon credit.

The purpose of the VCS (Voluntary Carbon Standard) is to establish a widely accepted baseline and crediting methodologies for the voluntary market. These methodologies have to be transparent and describe the forest management activity to take place and how carbon credits will be calculated. The rules must determine what is in and what is out, what project is acceptable and what is not acceptable. Projects must be verified, and you need some assurance that the verification is done by people who are actually capable of doing it. Lastly, there needs to be a registry or multiple registries to track the exchange of credits to ensure single ownership. These are the frameworks that the VCS has been building into its structure.

While the VCS does indeed strive to be a standard, we have learned from the voluntary market that flexibility is key. One thing that we know, and is evident in both the compliance and voluntary markets, is that we do not have a clue about how we do

Prior to 2002, forest carbon played a significant role in the voluntary carbon market because the projects were easy to sell.

emission reductions. That is, we are just beginning to work out the policy and market structures that will be needed to combat climate change. We have ideas, and we think those ideas will move us in the right direction, but we cannot be sure that these ideas will work in practice until we start implementing them.

Some of the CDM methodologies are classic examples of how offset standards are in fact works in progress. There was great potential in agriculture and for some of the landfill projects. However, once the program started and project owners came in with the first stratification, they were way below expectations. It was not necessarily that people did the projects or accounting incorrectly, but rather that the processes were slightly different from what was anticipated. These setbacks are part of life. Climate change is about predicting the future and trying to manipulate it as best you can. Since the objective is to constantly improve on “business as usual” industrial and land management practices, policymakers have to work with a moving target. This is why flexibility is key, because what seems right today may turn out to be impracticable tomorrow.

We have really tried to maintain flexibility with forests. A lot of people thought of forest carbon as complex, difficult, unreliable, and extremely hard to understand. The crediting methodologies are not necessarily visual. The only thing I understand is that, if I plant a tree and ten years down the line somebody comes around with a match and lights the whole thing on fire, I lose all my credits. That I can visualize, but not the rest of what goes into making a forest carbon credit. The voluntary market is useful in helping to develop innovative ways of dealing with this complexity.

The basic rules are actually not complicated, at least as a starting point. Calculating carbon in trees is not that complicated. A cubic meter is a half ton of credits. Commercial volume times two is stand plus canopy. And times three, you have the crown biomass. Those are the basic rules foresters already know. Yes, these basics need to be refined, but they are enough to do a back-of-the-envelope calculation to figure out how many credits a specific project may generate. If you want to go a little further and be more scientifically accurate, you go to any forestry library, pick up a growth table from any species, and you see what the expected growth will be for the next hundred years. Such tables provide stand volume from which to calculate carbon sequestration. Once you estimate sequestration you can look to see if it will be enough to cover project costs. Of course, it can get more complicated if you want to factor in span, crown, roots, natural mass, and soil carbon.

Calculating forest carbon can be simple or complicated. I would argue that a monitoring program for an oil platform would be equally as complicated as forestry. The same goes for landfills or any other offset projects out there. Forestry can get extremely difficult, but it does not have to be. We try to keep things as simple as possible by allowing project owners to be flexible in terms of how they want to earn carbon credit from their forest stands.

There is great potential to create many small forest carbon projects, but you need a minimum amount of acreage to generate cost efficient credits. You will not find too many options where 10,000 to 30,000 hectare forests will be able to produce the credit volumes needed to compete with some of the other projects that are out there.

Since the objective is to constantly improve on “business as usual” industrial and land management practices, policymakers have to work with a moving target. This is why flexibility is key, because what seems right today may turn out to be impracticable tomorrow.

Because of the social and biodiversity elements that must be addressed when setting up forest carbon projects, developers should not try to recoup all of the project costs through credit sales alone. In fact, there is no offset project in the world that can finance itself through credit sales alone, with the exception of about a dozen HFC-23 projects. These projects basically involve buying a piece of equipment for \$1 or \$2 and spewing out roughly 5 million credits a year. That is the only example where you actually can make an investment, and the investment would be paid for by the credits. No other project will do that. Energy efficiency projects recuperate expenses in part by reducing energy bills. A landfill project is the same thing, getting paid by the sale of electricity or heat that is generated on top of methane destruction credits. So don't try to recoup all the project costs through credit sales with forest or land use projects. You have to market some of the other attributes you are dealing with as well.

There are a few other marketable elements of forest conservation and restoration projects. For example, the behavior of people living on the project land must not conflict with the credit-generating activity. In order to do this, they must see some sort of commercial benefit from their participation in your project. The obvious choice for forest conservation is eco-tourism, but you may also want to consider participation in reforestation activities. Successful developers will look at alternatives for generating income for locals in addition to generating carbon credits.

There is no offset project in the world that can finance itself through credit sales alone, with the exception of about a dozen HFC-23 projects.

Large volumes are possible in forestry, but with the kind of acreage associated with large volumes, project owners will have to consider other effects. For example, where do you get 3 million hectares to begin your project? What are you going to do with the people living there? This is where the next step in project development becomes relevant. Large-scale projects require a more involved risk management system than smaller projects. Developers have to factor in fires, people coming onto the land, and even political risks like that possibility of having land confiscated in developing countries.

VCS is working with project methodologies that force developers to incorporate these risks into crediting. For example, what happens if someone buys credits today but the forest does not exist in ten years? The credits would have no value. A buffer approach like the one prescribed by VCS would require credits to be set-aside. These buffer pools function as insurance – if something goes wrong, the destroyed credits are backed up by unsold credits.

The non-carbon aspects of forestry, such as the social and biodiversity elements, should also be addressed in a Voluntary Carbon Standard. These elements do not need to be associated with every project, so standards should certify management on a piecemeal basis. For example, a project developer may not care about biodiversity, but may want to demonstrate fair treatment of indigenous persons. Others may be very sensitive to biodiversity and will look for a standard that gives biodiversity credits. Forest Stewardship Council certification is a related forest management standard, for example. Developers may be able to generate additional streams of finance by extending certification beyond just the carbon stored in the trees and soil. Monetizing these additional benefits may be enough to go ahead with projects that can cost as much as \$60-100 per ton of stored carbon.

Question & Answer Session

QUESTION 1: Informing federal legislation

How are NGOs, including Ecosystem Marketplace, informing the climate change policy discussions taking place in Congress? What are the major messages from the voluntary market that you would like to see reflected in federal legislation?

Katherine Hamilton

A lot of environmental groups are aggressively lobbying on the Hill, and Ecosystem Marketplace is sharing the data we have gathered over the years covering the voluntary and compliance carbon markets to inform their platforms.

QUESTION 2: Voluntary markets after federal regulation

Will there be a voluntary market for forestry carbon in the United States after compliance standards are written? What will be the role of standards that deal with the social benefits of conservation and restoration, as opposed to those that are concerned only with carbon sequestration?

Katherine Hamilton

Yes, there probably will be a voluntary market for forest carbon even after the compliance market goes into effect. One of the most interesting things we found in our study last year had to do with the buyers. Credit suppliers said that almost 50 percent of their buyers were coming from the EU, where there is a compliance regime. Many of these buyers are companies that are going above and beyond regulation, including those that decided to go carbon neutral. Therefore it looks like there will still be a demand for these credits, though a much smaller demand.

At this point, voluntary carbon market standards are influencing rule development for the compliance market. For example, the Climate Action Reserve Standard has been explicitly mentioned in legislative text. Both in U.S. and international policy debates, many discussions are centered around developing legislated assurances that carbon offsets will not have negative social or other environmental impacts. So while boutique standards related to things like biodiversity and social justice are mostly relevant to the purely voluntary market, they are influencing compliance discussions as well.

Edwin Aalders

I agree. Certainly there will be a market beyond the compliance market for voluntary credits, as evidenced by the fact that the biggest buyers now are actually those that are already regulated. Buyers are beginning to get comfortable with the regulatory markets and, by now, polluters have had some experience buying and selling carbon allowances and offsets. As a result, buyers can go further in terms of meeting their carbon offset demands.

I always compare the voluntary carbon market to what I saw when I worked with STS-Solutions, a consulting firm in the food sector on health and safety. The demands of the major retailers evolved significantly over time, moving from simple quality standards to detailed consumer requirements. Twenty years ago a retailer would have asked for “nice” tomatoes, so all the farmers would come up with nice tomatoes. Then, two or three years later, retailers began to request tomatoes of a certain color. The desired color differed by geography – it had to be green for the UK and a little bit redder in continental Europe – but retailer demands prompted farmers to tailor their offerings to the market. Then, 10 years later, size became a concern and so farmers worked to produce tomatoes of the desired size. Today retailers are getting pushback from consumers, so they are asking farmers to demonstrate that the tomatoes were grown in a manner that has no negative effect on employees and the environment. There is actually no legislation whatsoever in play for that discussion, but these demands are a way for some retailers to demonstrate that they are better than others.

This is the same sort of evolution you will see with the voluntary carbon markets. Once the pre-compliance structure and consumer learning processes are in place, buyers will begin to demand more. Therefore, you will see some of the standards, including the VCS, modify their requirements over time. Voluntary market standards will probably change in five to ten years. Once the regulatory market incorporates some of the “boutique” specifications we have talked about, the voluntary market will begin to request new standards of practice.

QUESTION 3: Double-counting between the voluntary and compliance markets

What is the possibility that double-counting of carbon credits could occur at the national level once the compliance market is in place in the United States? What might be the implications for the voluntary market?

Edwin Aalders

Right now we have two worlds: the compliance world – those who are following the Kyoto Protocol – and the voluntary world, which is made up of everybody else. This layer of complexity and two different markets allows for double-counting. This should disappear as we move towards a regulatory system, as the burden of proof required to trade credits in a compliance system is much higher. The transition process, however, is still expected to last another five years. Therefore, those operating in the voluntary markets will continue to work to prove that voluntary reductions and offsets are created following rules similar to those that will exist in a future regulatory market.

QUESTION 4: International forest carbon offsets versus U.S. economic development interests

Given worries about jobs and economic development in the U.S., what is the economic benefit of allowing international forest-based carbon offsets into a U.S. greenhouse gas emission cap-and-trade policy regime? What does this mean for a state like New

Hampshire, which is 70 percent forest and has potential to generate forest-based offset credits as well as renewable biomass for use in clean energy projects?

Edwin Aalders

The main argument behind allowing international offsets into a U.S. cap-and-trade program is that, in the end, it will reduce compliance costs to industry. If international credits are excluded from the U.S. compliance market, U.S. industry will be forced to make emission cuts internally because there are limits on the supply of domestic offsets. In the end, emission reductions are a global concept. Certainly we are looking at local steps to achieve it, but ultimately we are looking for emissions to be reduced somewhere on this planet. Allowing international offsets into a domestic market will reduce the overall cost of complying with emission reduction regulation by potentially including offsets that can be generated more cheaply abroad. While there are no cheap forest carbon credits, there are cheap foreign credits.

Sticking to forests, though, I am still trying to find the argument for allowing international forest-based offsets into the United States as opposed to just restricting allowable offsets to forests and agricultural sinks within the 50 states. Otherwise, yours is the same argument that is made for free trade in general: why don't Americans just buy the cheapest product from wherever it can be sourced, and keep import taxes and duties to a minimum? If other U.S. offsets, like renewable energy, can be created more cheaply than forest-based offsets, why not go with the most cost-efficient offsets that are created within the 50 states?

When the EU set up its Emission Trading Scheme, there were efforts to bring Certified Emission Reductions (CERs) from non-EU countries into the compliance market. The EU regulations made room for industrial and other offsets from developing countries to be used for compliance by EU polluters. Despite this openness, the majority of reductions recorded in the first two years of the ETS – in other words, the majority of allowances sold – came from EU polluters reducing their own emissions internally. Polluters found these initial reductions to be more cost-effective than buying offsets from abroad.

I am convinced that the markets will find the best way to stimulate cost-efficiency, and the type of offsets allowed into the system is irrelevant. I think the U.S. Environmental Protection Agency's Acid Rain program is a clear example where we have seen no real increase in allowance price over time. There has not been a long-term increase – over time the price has always gone down because, whenever the price got too high, new innovation came out that brought down the price of compliance. Limiting options would mean that the market would not necessarily be stimulated to come up with the cheapest way to achieve the emission reduction objectives set by law.

QUESTION 5: Offsets and cost containment

Some people are saying that forests and forest carbon credits, both domestic and international, are an important part of cost containment in the compliance markets. Kate, are you hearing similar things about cost containment?

Katherine Hamilton

As Edwin said, one of the arguments for including forest-based offsets is cost containment. Including many types of offsets also gives domestic producers more opportunities to be the cost-effective producer. If U.S. landowners can create an offset for \$10 a ton and the cost is \$11 a ton internationally, then U.S. landowners would be cutting emissions more efficiently than international participants. However, even if domestic producers cannot be the most efficient producers, openness to international offsets at least provides the rest of the market options for sourcing the least expensive emission reductions possible.

In U.S. climate bills, we are also seeing program set-asides where a percentage of funds goes to forest conservation. This is the case where forests are not seen to produce credits equal to the caliber of non-forest-based credits. You want all credits to be tradable and fungible from a market efficiency standpoint, but, in reality, a lot of discussion is based around establishing these funds. This is not for cost containment, but rather to appeal to different sectors.

QUESTION 6: Set-asides for small-scale forestry projects

The Lieberman-Warner Climate Security Act of 2008 had a provision that would have set aside about 10 percent of the funds that came from the auction of credits for climate change adaptation on forestland and other lands that were of value to wildlife and biodiversity. Is there anything similar to that in the Waxman-Markey American Clean Energy and Security Act of 2009? Are the cap-and-trade advocates you mentioned earlier sympathetic to such a set-aside system or are they completely focused just on getting the market established?

Edwin Aalders

I do not know the details, but I would say that, from an industry perspective, the primary drive is to get the market mechanism to work. The market has been generally sympathetic to the fact that there is a need to set aside funds to address the added values associated with small-scale biodiversity and forest conservation projects. At the moment, however, the main focus is on pulling together the tools critical for a functioning market.

Katherine Hamilton

I would add that the language for the Waxman-Markey bill has not yet been released; it is expected to be released next week. I do know that a lot of people who are sending language to be added to the bill are proposing set-asides. Parts of the NGO community are really divided on this issue. Some NGOs want forestry to be a recognized form of carbon offset, and others think that a market mechanism is not appropriate. I know that the forestry/NGO community is working through that right now and deciding on the language to suggest to Congress. I am seeing different groups send in different suggestions on the issue of set-asides.

QUESTION 7: Costs of U.S. forest carbon credits

Are there any cost estimates for afforestation or reforestation credits generated in the United States?

Katherine Hamilton

The costs range significantly, but I have recently seen numbers forming in the range of \$35 to \$45 a ton to generate forest carbon credits in the United States.

QUESTION 8: Guaranteeing permanence

I am concerned about global climate change and want to make certain that whatever legislation is enacted really works. By that I mean that any offset credit that is counted should result from an activity that has aspects of additionality, so that the carbon-saving activity would not have happened if not for the monetization of the credit.

In addition, and perhaps more importantly, the offset should be permanent. If credits are granted for renewable energy, like a wind project, there will be zero carbon dioxide emissions associated with the electricity produced. Regardless of what happens in the future, throughout all of time, nothing can change that fact. A good custodian on a forestry project may be able to ensure that carbon will remain sequestered and will not be released for his or her lifetime, and maybe there can be a conservation easement put on the land, but how can I be sure that the offset will be there in perpetuity – forever?

Edwin Aalders

As far as I know, the United States is like many of the other countries around the world in that once you put multiple trees in the ground together, it is considered a forest. This is the basis for the land classification system, and converting it back to anything other than forest is difficult. Once trees are in the ground, it is unlikely that the landowner would convert it back to agriculture or some other land use. In areas of the United States where there are not regulatory restrictions on such land conversions, however, carbon credits should be discounted to account for conversion risk. This is where the buffer approach comes into play. Carbon credits will have to be discounted to account for the risk of land conversion.

QUESTION 9: Forward payments

What are forward payments for forest carbon?

Edwin Aalders

Forward payments are good for forest carbon projects because project costs are borne up front. Forward payments are payments to the project developer that are made before the sequestration actually takes place. Initial payments are often made at the completion of planting, with the balance to be paid after certain assurances are met or milestones are reached, such as successful verification. The terms of the payment arrangement are specified in a contract between the buyer and seller. The buyer

agrees to pay certain amounts of money at specified times, and the seller agrees to transfer ownership or a given quantity of carbon credits at specified times. Of course there would be penalties if a seller/project owner cannot meet the delivery requirements.

Katherine Hamilton

Buffers are one way that sellers can help to guarantee they will meet contractual delivery commitments. Buffers are one form of insurance for buyers that are buying credits via forward payments. One standard, the American Carbon Standard, specifically states that outside insurance, such as commercial insurance, can be used to provide delivery insurance.

QUESTION 10: Motives of voluntary market buyers

Kate, could you talk a bit more about firms buying credits for pre-compliance? I have heard that firms are buying credits primarily for corporate social responsibility purposes, and not for pre-compliance in anticipation of an expected regulatory regime.

Katherine Hamilton

There are two types of firms buying “pre-compliance” credits. Most buyers are intermediary buyers aiming to sell credits in a future regulated program. Most of the pre-compliance buyers are buying and holding onto their credits, not reselling them. Alternatively, other firms that are buying credits for public relations are buying the credits and then retiring them. Retiring the credits means that the credits no longer exist and cannot be used for compliance or resold. In some cases, firms that will likely be regulated are also buying credits.

QUESTION 11: Motives of standard-setting organizations

Do you think the standards and certification systems we see today are vying for competition within the voluntary market? Or are they driven by the desire to influence or perhaps become the standard for the compliance market?

Katherine Hamilton

I think that, at first, the standards were competing to be the main standard for the voluntary carbon market. Now, as compliance gets closer, many of them, particularly those that have positioned themselves as commodity-carbon standards, such as the VCS, are really interested in the regulated market – as opposed to the playground of the voluntary market. They are hoping to get adopted as a regulatory standard.

Edwin Aalders

The International Emissions Trading Association (IETA) and the VCS are not so much interested in establishing voluntary markets as they are in ensuring that the compliance market advances. Starting about two years ago, a lot of stories came out

about some actors in the voluntary market being “carbon cowboys.” These actors were accused of selling carbon credits that simply did not exist in reality. As a consequence, people began to question the entire offset mechanism, including the CDM and Joint Implementation (JI) offsets allowed for compliance under Kyoto. This distrust of offsets in general was the primary driver for the International Emissions Trading Association (IETA) to enter into the debates on voluntary market standards. It was a drive for voluntary regulation in order to establish confidence in the voluntary market as a whole. Generating confidence in the voluntary market will also protect the regulatory market.

As I mentioned earlier, I fully expect that the voluntary market will continue into the future, but its shape will change. It will become more and more concerned about the other values that people want to see associated with those credits, like biodiversity and environmental justice. These will be the next generation of forest carbon credits.

Critical Insights into the U.S. Carbon Markets

Justin Felt

*Product Manager
Point Carbon*

Justin Felt is a Product Manager at Point Carbon, where he leads the company's North American offset analysis products. As part of his graduate studies prior to Point Carbon, he worked variously with Dow Chemical, Weyerhaeuser, Global Forest Partners, and Waste Management to help build their respective climate change strategies. He is also co-author of a report entitled, "Renewable Power, Policy, and the Cost of Capital." Prior to graduate school, Mr. Felt acted as corporate finance team lead in IBM's Software Group. He holds an M.B.A./M.S. from the University of Michigan and a B.A. in Economics and Foreign Affairs from the University of Virginia.



Elizabeth Zelljadt

*Senior Analyst
Point Carbon*

Elizabeth (Lisa) Zelljadt is a Senior Analyst in Point Carbon's research group, where she focuses on U.S. federal and regional climate policy and is responsible for educational programs. She previously worked as a journalist, covering U.S. and global climate change policy and market developments. Before joining Point Carbon, she worked with the European Environment and Sustainable Development Advisory Councils and non-governmental organizations in the U.S. Ms. Zelljadt holds a B.A. in Political Science and International Studies from Northwestern University and an M.A. in Environmental Policy from Universität Greifswald in Germany.



October 28, 2008
5:30 to 7:00 p.m.
Yale School of Management
135 Prospect Street

Chapter 5

Critical Insights into the U.S. Carbon Markets

Justin Felt
Product Manager
Point Carbon*

Elizabeth Zelljadt
Senior Analyst
Point Carbon*

This chapter provides an introduction to the policy and regulatory frameworks that are developing around carbon emission caps, cap-and-trade systems, and offsets. It begins with a basic overview of sources of greenhouse gas emissions in the United States before moving into a discussion of carbon market fundamentals, three U.S. regional systems, and the various cap-and-trade proposals at the U.S. federal level at the time the talk was given. Since the presentation took place in 2008, it does not include the Waxman-Markey proposal, although bills such as Lieberman-Warner make for appropriate comparisons. The talk concludes with a discussion of the voluntary markets, with particular attention given to forestry offset projects.

* For more information on Point Carbon, please go to www.pointcarbon.com

INTRODUCTION

Elizabeth Zelljadt

Point Carbon is primarily a provider of research and analysis on greenhouse gas emissions trading markets. I am on the Research and Advisory team and Justin Felt manages a product that deals with offsets and databases. We have a separate consulting part of the firm that represents most of our advisory function. We also provide power and gas trading and analytics, which are more traditional, utility-centered advisory and data analysis services.

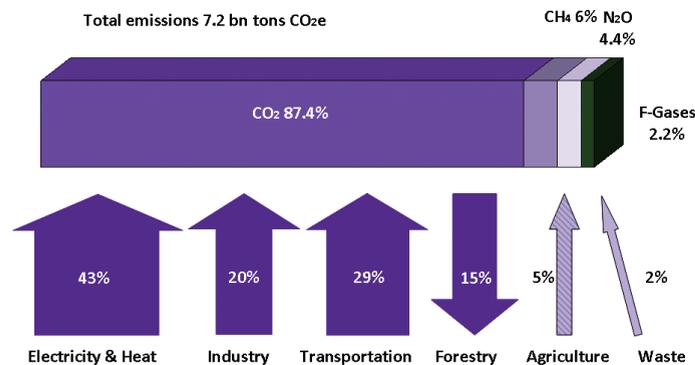
I will begin with a quick overview of greenhouse gas emissions, cap-and-trade systems, the carbon market, and some of the U.S. regional systems that are aimed at achieving greenhouse gas reductions. After that, Justin is going to look more specifically at the voluntary market for offsets.

CARBON FUNDAMENTALS

Greenhouse gas emissions

You have probably all seen charts similar to that in Figure 1, which shows the main sources of greenhouse gas (GHG) emissions in the United States.

Figure 1 Main sources of GHG in the United States



Source: World Resources Institute

The Kyoto Protocol is an agreement under the United Nations Framework Convention on Climate Change (UNFCCC) that was established in 1992. Nearly every nation in the world, including the United States, signed on to the Framework, which established an intergovernmental structure for addressing the challenge posed by climate change.

The United States emits about 7.2 billion tons of carbon dioxide equivalent (CO₂e) annually. CO₂e is the standardized unit of greenhouse gases. For example, under this metric each unit of methane equals 21 units of CO₂e, since methane is 21 times as potent per molecule as CO₂ at trapping heat in the atmosphere. The so called F-gases like HFC23 are exceptionally potent.

Figure 1 shows the sources of CO₂e for the United States. These can be different across countries. In Canada, for example, about 75 percent of GHGs come from CO₂ emissions, and a larger portion of the total comes from methane than in the United States. For each country there is a different spread of carbon sources and sinks.

Carbon markets

Carbon markets have developed as a way to help address growing concerns about the climate change caused by these emissions. To give an overall picture of what carbon trading is like around the world, we should look to the Kyoto Protocol. The Kyoto Protocol is an agreement under the United Nations Framework Convention on Climate Change (UNFCCC) that was established in 1992. Nearly every nation in the world, including the United States, signed on to the Framework, which established an intergovernmental structure for addressing the challenge posed by climate change.

Following this agreement, the Kyoto Protocol was adopted in 1997. It divided countries into two types: nations that committed to reaching binding targets to reduce their emissions levels to a certain percentage below their respective 1990 emissions, and countries that were not required to take on binding targets but still had to meet all the other prerequisites of the UNFCCC. There is often media confusion about countries that are not part of the Kyoto Protocol. Many developing countries that are not “Annex I” countries with binding targets are still part of the agreement. Even without binding targets, it is quite difficult to meet many of the requirements, such as monitoring and submitting the necessary reports to the U.N. The developing countries that fall into this group cannot participate in the flexible mechanisms, which I will soon describe, without first complying with all of these requirements.

Industrialized countries with binding targets achieve compliance with their Kyoto goals by instituting domestic cap and trade programs, as the European Union did. In addition to the European Union Emissions Trading System (EU ETS), there are emissions trading systems being developed in Australia, New Zealand, and Japan. The Canadian province of Alberta also has a system, although it is more of a baseline and credit system than cap and trade. The Canadian federal government is looking to institute a similar version to reduce its greenhouse gas emissions.

Industrialized countries bound under Kyoto can also use offset mechanisms to achieve their targets. One such mechanism is called Joint Implementation. Joint Implementation is when a company from one industrialized country sponsors an emissions reduction project in another industrialized country where it is probably cheaper to do that particular reduction project. Another offset mechanism is the Clean Development Mechanism, where a company in an industrialized country will do an emissions reduction project in a developing country that does not have a binding target. The emissions that are reduced can then be used to meet the compliance obligation of the industrialized country or of a company within that country.

Cap and trade primer

To go quickly through the economics of cap and trade and its underlying philosophy, let's suppose two companies – company A and company B – emit 12 million tons and 15 million tons of CO₂, respectively. One could craft regulation that requires both of these companies to meet a cap of 10 million tons. If this is done in the “command and control” style, then each company is required to meet the cap, meaning that company A would have to reduce its emissions by 2 million tons and company B would have to reduce its emissions by 5 million tons.

But what if for one company these reductions happen to be cheaper? Suppose that company A has an innovative technology and, with lower abatement costs, can go beyond its target. Meanwhile, suppose company B's old stodgy technology makes emissions more expensive than for company A. In a cap-and-trade system, company B can buy company A's less expensive excess reductions and then use those purchased reductions toward meeting its own emission reduction target. The net cost is therefore less for the same result as would have been achieved under a command and control scenario.

Offsets come in from outside of the covered (capped) sector. They come from specific projects that decrease the amount of greenhouse gases in the atmosphere. Any company within the covered sector could meet its reduction targets by acquiring offsets from these projects.

This is generally how carbon markets work all over the world. In this chapter, however, we are not going to address the Kyoto Protocol or global cap-and-trade systems in depth. Instead, we will confine our scope to North America, and Justin Felt will focus mostly on North American offsets.

U.S. carbon markets

Even though the United States is not part of the Kyoto Protocol, significant activity is emerging. A federal cap-and-trade system might be coming soon. There was a bill that made it all the way to the Senate floor in June 2008, the so-called Lieberman-Warner Bill, which would have proposed a cap-and-trade system for the United States starting in 2012. I will explore that a bit more later. There are also several regional programs emerging, including the Regional Greenhouse Gas Initiative (RGGI), of which Connecticut is a member state. RGGI will enter into force officially in January, and there has already been an auction of allowances. Some other regional programs are the Western Climate Initiative (WCI) and the Midwestern Greenhouse Gas Reduction Accord, the latter of which is just getting off the ground but looks like it might enter into force earlier than any federal program, even if Congress does pass federal legislation soon.

The research team at Point Carbon has been keeping our eye on these markets – how they are developing and how they are structuring their cap-and-trade systems.

Voluntary markets

Sitting between the Kyoto market and what's happening in the United States are the voluntary markets that are present everywhere. These are the markets through which you offset your travel or try to achieve “carbon neutrality.” They allow participants to voluntarily buy offsets to account for their emissions. The Chicago Climate Exchange is an example of a voluntary trading platform.

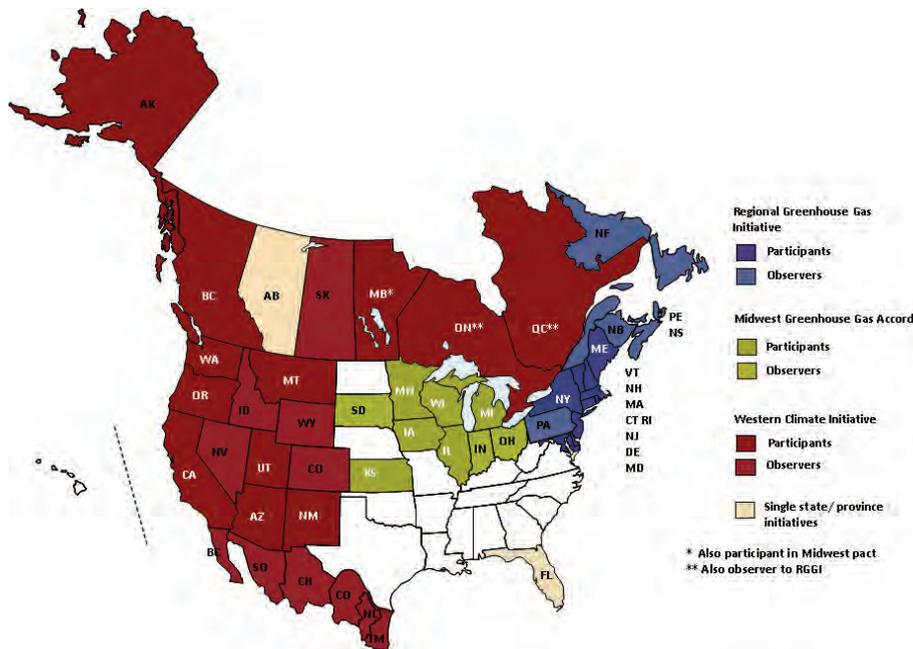
U.S REGIONAL MARKETS

Figure 2 shows the different regional systems in North America, highlighting observers and participants. Quebec and Ontario are members of the Western Climate Initiative as well as RGGI observers. Manitoba only emits about 2 million tons of CO₂ a year, but it is part of both the Midwestern system and the Western Climate Initiative.

The Western Climate Initiative is the most developed regional market after RGGI. There have already been some recommendations from officials in the participating states about how to structure the system. The interesting thing about the WCI – and this relates to why Ontario and Quebec, which are actually further east, are still participating in it – is that it may cover the transportation sector in addition to the

utility sector. RGGI covers only utilities; the EU system that has been up and running since 2005 covers utilities and industry (i.e., major large final emitters). This is a key difference, and it has to do with the emissions profile of the western states. Almost 40 percent of the total emissions from these western states comes from transportation (cars, trucks, etc.) compared to a much smaller percentage on the east coast. If you are going to have emissions trading and are not including one of the biggest sectors – i.e., transportation – it is not going to have much of an effect in terms of reducing emissions. For this reason, the western states decided to create more of an economy-wide cap in a way that has never really been done before.

Figure 2 Regional cap-and-trade schemes in North America



This is also the reason Quebec and Ontario were interested in joining the WCI. Quebec has almost entirely hydro production for its electricity, so capping its utility sector would do little to reduce its emissions. Ontario is gradually phasing out its coal plants and has rising emissions in transportation, so it is participating for generally the same reason.

It is going to be very interesting to see how states choose to incorporate the transportation sector into their targets because, as I mentioned before, the concept is totally new. The point of regulation for greenhouse gas emissions won't be at the emitter level because it is not feasible to cap every tailpipe of every car. The cap will instead be at the fuel source, or the stage at which the transportation fuel enters the commerce of the respective state. Under this structure the fuel refineries and loading docks for natural gas, for example, will be the compliance entities that have to surrender the requisite allowances for the carbon content of the fuel.

Regional Greenhouse Gas Initiative (RGGI)

The states involved in the Regional Greenhouse Gas Initiative include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Pennsylvania, the District of Columbia, and the Eastern Canadian Provinces are observers. The overall stated goal of RGGI is to stabilize the absolute emissions from the utility sector of these states over the period from 2009 to 2014, and then reduce those emissions 10 percent below 2005 levels by 2019 – approximately 2.5 percent per year. 2005 is about the closest we have to “current.” This latter goal implies about a 2.5 percent reduction per year.

One problem with RGGI is that its measurements are in short tons, as opposed to the metric tons used by everyone else. When you’re talking about so many millions of tons of offsets, the difference does become significant when you forget the conversion. Everyone should always keep in mind that RGGI is in short tons.

RGGI’s offsets are also different from those under the Kyoto Protocol. Under the U.N. system, offsets are decided on a project-by-project basis. Say you want to cap a landfill and prevent methane from entering the atmosphere and contributing to climate change. You may burn off the methane, converting it to CO₂, or you may decide to use the methane to generate electricity. Either way reduces emissions, and because the project is in a sector that is not covered by the cap, it produces an offset. You would propose the particular project to the U.N., requesting offsets for your activities, and would then need to complete a complicated evaluation process.

In contrast, RGGI has eliminated parts of that evaluation process. It simply sets out five different categories for which offsets can be produced, and if a particular project fits the description that has been laid out in the overall rules, it can qualify for offset credit. Thus the offset project does not emerge from the bottom up; instead, project types that can be used for compliance are mandated. In some ways that’s good, but in some ways it might reduce innovation because there are only certain project types that can be used. If a project doesn’t comply with that type, then that is too bad.

However, it looks unlikely that there will be significant demand for offsets from RGGI because the system is actually over-allocated as it is. There was a lot of switching from oil to natural gas in many of the utilities that are affected by the cap, and so they’ve naturally accomplished some emission reductions by switching from a high carbon fuel source to a lower carbon fuel source. As a result, it looks like offsets, which would normally be used to compensate for the excess emissions of these utilities, won’t be needed because there will be few, if any, excess emissions above the cap.

The offset projects for RGGI can be sourced from anywhere in the country as long as the state in which the offset project takes place has a special memorandum of understanding with the RGGI overall body, RGGI Incorporated. This memorandum ensures that RGGI protocols have been followed.

Western Climate Initiative (WCI)

The specifics for the WCI are not as well established as those for RGGI. The WCI has not yet had an auction for its allowances and it is still unclear exactly what is going to be covered, due to the WCI’s effort to include the transportation sector under its cap.

The target, however, is already set – 15 percent below current levels by 2020. “Current” again refers to 2005 because that is the year for which we have the best data. The target is an aggregate of all the individual states’ and provinces’ targets. In order to be part of the Western Climate Initiative, a state or province has to have its own individual target. California, for instance, has a law that requires it to reduce emissions to 1990 levels by 2020. British Columbia has a requirement to reduce emissions 33 percent below 2005 levels by 2020. Each WCI state has a different individual target that in aggregate amounts to a 15 percent overall reduction. Each state will have to meet its individual state target as well as the overall one by 2020. Utah is the only participant that has not yet created its own individual target. The WCI includes Arizona, British Columbia, California, Manitoba, Montana, New Mexico, Ontario, Oregon, Quebec, Utah, and Washington with a variety of other U.S. and Mexican states and Canadian provinces as observers.

The WCI will probably come out with specific allocations next year, detailing the allowances for each state and how those allowances will be distributed. The body that decides the structure of the WCI, mostly officials from the states and provinces involved, gets together every couple of weeks to discuss issues such as what types of offsets might be allowed and what quantity of offsets can be used toward a compliance obligation. The target for this latter limit has been declared to be 49 percent of required reductions, so that less than half of the reduction wedge can potentially be accomplished through offsets. Another recommendation concerning the WCI offsets was to count not only offsets from projects, but also emissions credits from other trading systems. This would make allowances from RGGI a tradable unit within the WCI, raising questions about the overlap between the systems. For example, should the value of a RGGI credit be the same as an allowance under the Western Climate Initiative (especially since different sectors are included)? One would think that a credit might be more expensive in the west because transportation is included among the sectors covered and the caps are expected to be more stringent.

There is a lot to think about in the interaction between these systems, but RGGI starts January 1, 2009, and the WCI is scheduled to start January 1, 2012, so we will have some experience with RGGI before these interactions begin.

Midwestern Accord

The newcomer in all of this is the Midwestern Accord. A couple of states in the Midwest looked to the east, looked to the west, saw what was going on, and decided that maybe they would create a regional system as well. The Midwestern Accord is the least defined of the current regional systems, with meetings concerning it having started just last year. It covers a large portion of the population and emissions of the United States, but all that has been decided so far in terms of overall targets is that the system should achieve the Intergovernmental Panel on Climate Change’s (IPCC) recommendations to cut emissions 60 to 80 percent below current levels by 2050. The Accord includes Iowa, Illinois, Kansas, Manitoba, Michigan, Minnesota, and Wisconsin, with Indiana, Ohio, and South Dakota as observers. Short term targets have not yet been decided, but a group called ICF that does a lot of energy modeling is testing, via models, what 15, 20 and 25 percent reductions by 2020 would mean economically. A fixed target will

Another recommendation concerning the WCI offsets was to count not only offsets from projects, but also emissions credits from other trading systems. This would make allowances from RGGI a tradable unit within the WCI, raising questions about the overlap between the systems.

hopefully be set based on the results; from there we will be able to see how the Midwestern Accord will play out in comparison with some of the other trading systems. The deadline for the decision on a fixed target has been set for May 2009.¹

¹ The June 2009 GHG Draft Advisory Group Recommendations include a reduction target of 20 percent below 2005 levels by 2020.

U.S. FEDERAL POLICIES

In terms of federal policies, I mentioned previously the Lieberman-Warner bill that made it to the Senate floor in June 2008, which is further than any other U.S. bill thus far. There were cap-and-trade recommendations made by Senator John McCain and Senator Joe Lieberman way back in 2003, and the 2008 Lieberman-Warner proposal is actually quite similar to those. Lieberman-Warner is kind of an amalgamation of all the other carbon emissions bills that were proposed in the 110th Congress.

Figure 3 shows U.S. greenhouse gas emissions if we continue business as usual (i.e. if the United States does nothing to try to curtail emissions) versus what the trajectory would be if we follow the guidelines put out by different bills. You can see from the chart how the individual components of a bill have a large effect on the resulting emissions trajectory. For example, the Bingaman-Specter bill – Senator Jeff Bingaman is Chairman of the Senate Energy and Natural Resources Committee – stops reducing carbon around 2030 because it includes a price cap. Under this system, when the price of an allowance gets to \$12, more allowances will be issued, kind of like printing more money. This would not cause emissions to go down any further, but rather would act as a so called “safety valve” to stop prices from getting too high.

As stated earlier, the Lieberman-Warner Bill is a kind of amalgamation of all the other pieces of legislation. It is worth presenting a few unique facts about it because it is in many respects the blueprint for what people expect will be in the bill that eventually passes. These facts are as follows:

- Made it to the Senate floor in June 2008, but was not passed.
- Would impose an economy-wide cap-and-trade program on the United States.
- Aims to achieve about 70 percent reduction in GHG emissions from current levels by 2050.
- Covers roughly 80 percent of the U.S. economy (including transportation).
- Trading would start in 2012, with a cap at 5.8 billion allowances.
- 30 percent offsets allowed: 15 percent domestic, 15 percent international (including up to 10 percent forestry).

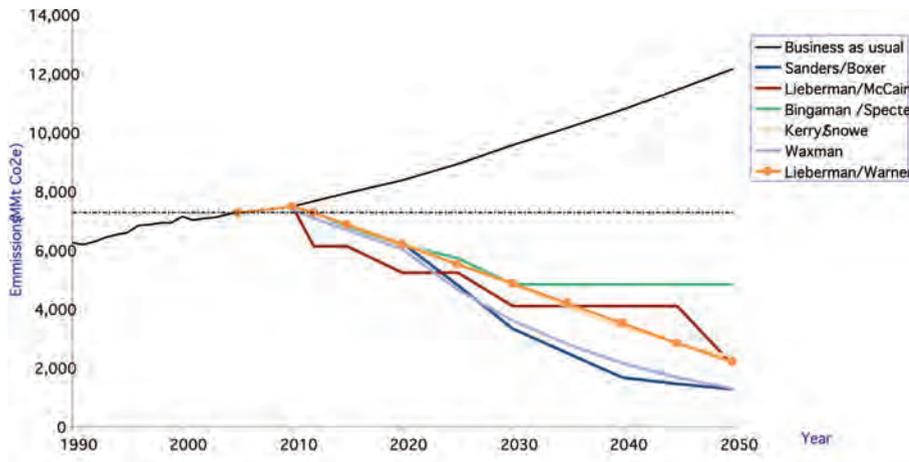
The 70 percent reduction in greenhouse gases by the middle of the century would cover nearly the entire economy, including transportation, as under the WCI. We will thus encounter on the federal level the same problem that the WCI is encountering now: At what point do you actually implement the regulation?

In terms of offsets, there would have been 30 percent allowed overall. That is, a covered company can account for up to 30 percent of its compliance obligation through offsets, half of which have to be domestically sourced. If enough domestic

offsets cannot be found, then international ones can be used, and some of those can be forestry. The bill is very specific about how these offsets are organized.

Figure 3 Legislative action and federal bills: Economy-wide U.S. emission targets²

² Bills in the 110th Congress



The main point about the next administration is that both candidates are for a cap-and-trade system. Senator McCain, as mentioned above, has already proposed a cap-and-trade bill. Obama declared in his platform that he is very much in favor of using a cap-and-trade system to reduce emissions. This is reflected in the market, because prices for the RGGI allowances as well as prices on the voluntary Chicago Climate Exchange (CCX) fluctuate according to political events. There was something called the “Super Tuesday effect” after it became clear that the next U.S. presidential election would be McCain versus Obama, since both of them are pro cap-and-trade. Prices on CCX went skyrocketing. It is really interesting how policy-driven this market is.

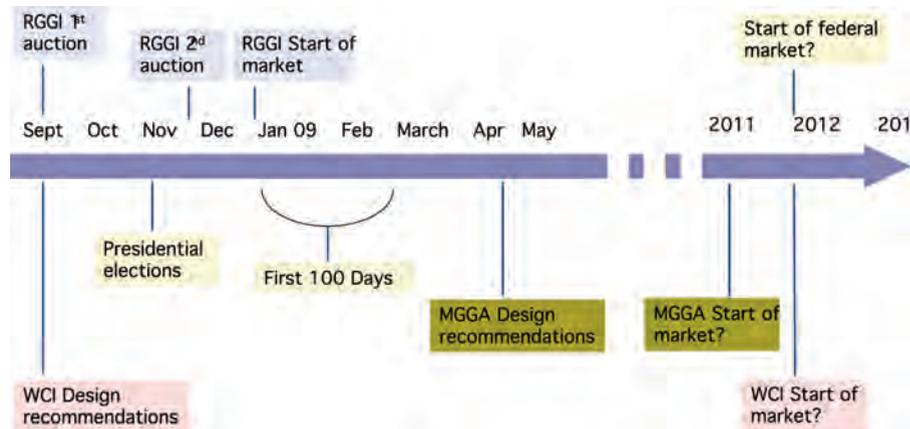
The major differences between McCain and Obama, even though they both agree that a cap-and-trade system is the way to go, lie in the details. McCain is very much pro nuclear, and he thinks that nuclear, because it does not produce greenhouse gas emissions, should be subsidized in addition to the subsidy it would already get through a cap-and-trade system. Obama is very much in favor of an auction, so that emission allowances are not distributed for free to the emitting entities based on their historic emissions; the auction would instead make these entities pay for their allowances.

The trajectory also looks very different under McCain’s proposal than it does under Obama’s. According to their respective platforms, Obama is looking for an 80 percent reduction by mid-century, while McCain is looking for a 60 percent reduction. You never know, of course, what would actually pass under their respective potential administrations.

Another difference in their platforms is the use of offsets. McCain specifies support for 100 percent offset use at the beginning. When the carbon trading program would start, utilities or whoever else is covered could offset all of their emissions and not have to make any internal reductions. Over time, the percentage allowed would decrease. Obama's platform has not specified the degree to which offsets could be used, but it certainly will not be 100 percent.

Figure 4 is a timeline for the development and expected development of U.S. policies starting in September of 2008. At that time, there were some major design recommendations from the Western Climate Initiative. RGGI also had its first auction in September, and that set the price for an allowance at \$3.07, which is quite low compared to the EU ETS. But, since the RGGI system was over-allocated, the low price was not unexpected. We are going to have a presidential election next week, after which Point Carbon will have its big conference where we will be talking about the results of the election and how it will affect carbon markets.

Figure 4 Timeline for expected U.S. policy developments



The second auction for RGGI, on December 17, 2008, involved all the RGGI states; the first one did not involve everybody, including the biggest emitter among them, New York. That will be a good thing to keep an eye on in terms of price formation in RGGI. The official start of the RGGI market will be in January because that is when the regulations actually enter into force.

The Midwestern group's design recommendations are due out in May 2009. It is actually due to start slightly earlier than the Western Climate Initiative because participants felt that they could get their structure together sooner.³ The Western Climate Initiative and possibly the federal program are set to start in 2012. Bringing things back to the international side, the first commitment period of the Kyoto Protocol officially ends on December 31, 2012. What happens after that is key, and is supposed to be decided in Copenhagen at one of the Conferences of the Parties to the Kyoto Protocol at the end of 2009.

³ The Midwest Greenhouse Gas Initiative pushed its start date back to 2012, in line with the WCI.

Ten percent forestry offsets⁴

The provision about offsets under Lieberman-Warner is worded in a very complex way, and there are categorical defaults. The bill clearly allows 15 percent of offsets to be domestic. If a covered entity cannot satisfy 15 percent of its compliance by finding domestic offsets – which is very likely because there are not a lot of domestic offsets around that have been certified – then it can resort to international offset credits. Those international credits, which can comprise up to 15 percent, are broken up into a 5 percent bin of general offsets, which we interpret to be like Certified Emission Reductions (CERs) under the Clean Development Mechanism, and a 10 percent bin which can be composed of international forestry credits.

This was the first specific mention of forestry in any sort of U.S. bill or proposal, and we are not really sure where it came from. The topic of reducing deforestation is heating up in the U.N. discussions, and perhaps that is being reflected domestically in this bill's efforts to promote emissions reductions from the forestry sector via avoided deforestation. The bill does not specify what type of offset would count as a domestic offset, but it does specify some of the protocols, such as the California Climate Action Registry, which do contain some forestry protocols.

⁴ The Lieberman-Warner bill failed to advance in the Senate in June 2008, so the following discussion of the treatment of forestry under the bill is relevant only for historical context.

THE VOLUNTARY MARKET

Justin Felt

The voluntary market exists outside of the regulatory regime. Large corporations purchase from it as pre compliance buyers, while people like ourselves, as well as organizations from the World Bank to Google or Yahoo, use these markets to reduce their carbon footprints.

The worldwide carbon market is about 2.7 billion tons (Figure 5). In 2007, it had roughly \$60 billion in traded value, which grew about 80 percent from the previous year in terms of volume as well as in terms of price and traded value. Within that, the worldwide voluntary carbon market was only about 65 million tons, meaning that about 2 percent of the worldwide carbon market volumes were voluntary. So, the voluntary market is very exciting, but it needs to be put into context as a small part of where the money and the volume are really being driven, which is through the mandatory market.

That said, the voluntary market is growing by leaps and bounds. That 65 million tons – which translates to about \$330 million in traded value – was more than a 100 percent increase from 2006. That is phenomenal growth, and I think it is the reason you see a lot of organizations trying to enter the market, both on an NGO level and on a company level.

Scaling down that voluntary market to just North America, we get a sense of the carbon offset pipeline in Figure 6. The pipeline for 2007 was 13 million tons, and for 2008 it was about 15 million tons.

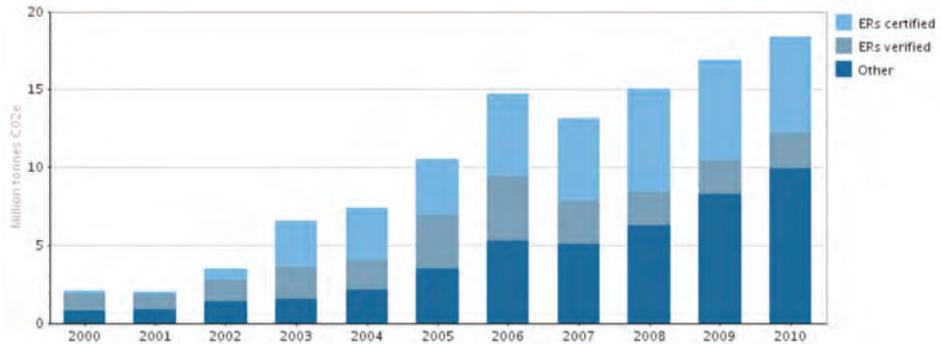
The demand side of the voluntary market is fueled by corporate social responsibility and pre compliance. Pre compliance buyers anticipate a compliance

market by purchasing offsets that they hope to get credit for in some forthcoming regulatory regime. Under this activity, an organization hopes to purchase carbon offsets now at, say, \$4, and be able to use or sell them in a future regime when they are worth maybe \$15 or \$20.

Figure 5 Worldwide carbon market



Figure 6 North America: supply and demand

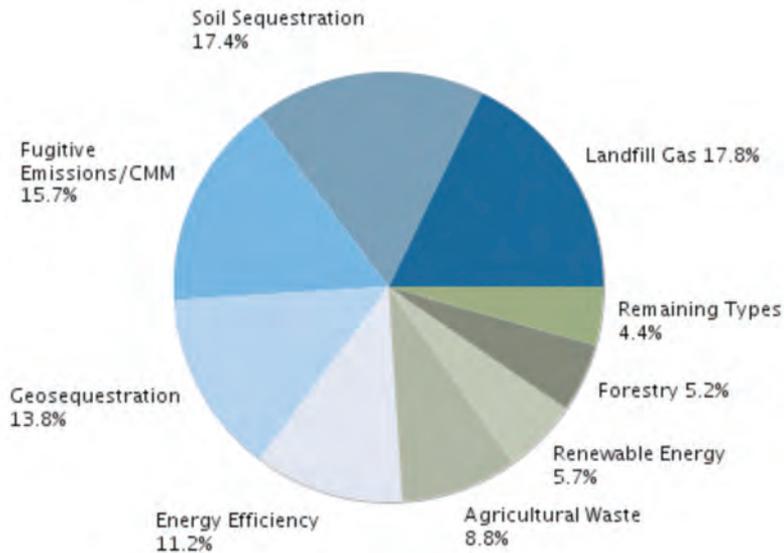


The supply side is fueled by a number of project developers. America’s great entrepreneurial spirit has fueled a lot of companies jumping into this space. European companies also see opportunities for growth in the United States and so are moving operations and making investments in this market.

We see the different offset types by volume in North America in Figure 7. Note that renewable energy is a relatively small portion of the carbon offsets in the United States. Additionality can be very difficult to establish with renewable energy projects, especially if the offsets occur in a state that has a renewable portfolio standard or another policy that provides incentives or requirements for utilities to fund renewable energy. In these cases, it is difficult to say that these carbon offsets would not have happened anyway and that they are above and beyond business as usual. Environmental benefits of renewable energy can also be monetized in the United

States through renewable energy certificate markets. A lot of these renewable energy projects actually prefer to sell renewable energy certificates rather than carbon offsets, and there is an interesting balance between these different approaches.

Figure 7 Projected 2008 offset volumes in North America



Forestry offset projects

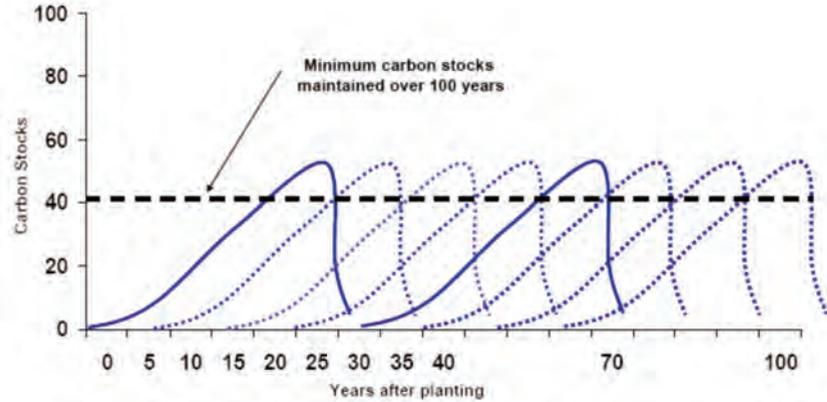
Figure 7 also shows that forestry, like renewable energy, is about 5 percent of the projected 2008 North American carbon offset volume. Although this gives the impression that forestry is not a big contributor, some of these projects are huge. Furthermore, forestry projects often have a long time horizon, such as 100 years. As a result, their annual sequestration is not as high as that of some of the other offset projects.

The one methodology, or subtype, of forestry that seems to get the most traction on the Clean Development Mechanism side, as well as from RGGI and a few other regimes, is afforestation/ reforestation (see Figure 8). This basically means replanting trees. Some of the other subtypes are forest management, conservation forestry, and urban forestry. Forest management refers to when the carbon stock is growing, but not necessarily on land that was previously developed or previously unforested. This raises certain questions. If a carbon stock increases on a year-to-year basis, are you able to sell credits? Or, if it drops, do you have to buy credits? Would this land otherwise be developed? And, if so, how do you judge forest management versus business as usual?

Conservation forestry, or REDD (Reducing Emissions from Deforestation and Degradation), boils down to avoided deforestation. That is a very difficult thing to quantify because it entails deciding what would happen in the business-as-usual context. For instance, you would have to make the case that this land would have been developed if not for the conservation forestry project.

Renewable energy is a relatively small portion of the carbon offsets in the United States. Additionality can be very difficult to establish with renewable energy projects, especially if the offsets occur in a state that has a renewable portfolio standard or another policy that provides incentives or requirements for utilities to fund renewable energy. In these cases, it is difficult to say that these carbon offsets would not have happened anyway and that they are above and beyond business as usual.

Figure 8 Forest carbon stocks over time



Urban forestry, a new methodology under the California Climate Action Registry, is essentially the same idea as conservation forestry except that it is in an urban setting. It is not necessarily on undeveloped lands, and can be in parks or even along sidewalks.

Figure 9 Forestry in the carbon market

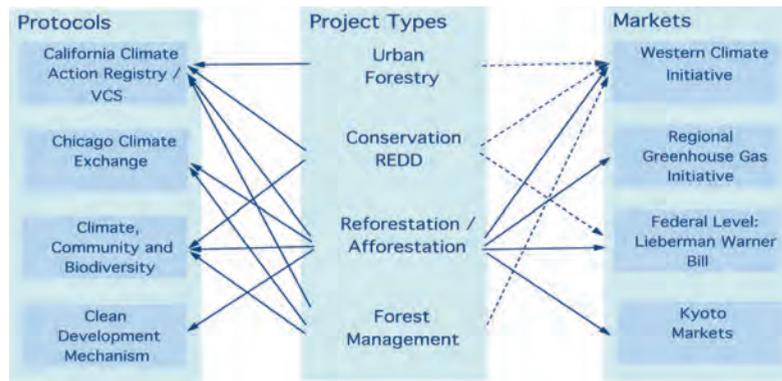


Figure 9 contains different types of protocols, or ways of calculating emissions reductions. The California Climate Action Registry and the Voluntary Carbon Standard (VCS) are two different but very similar voluntary standards. The Chicago Climate Exchange is a separate, standardized protocol that also has an exchange for selling offsets. Climate, Community and Biodiversity has more of an international focus, but it is starting to move into the United States. It looks at social and biodiversity benefits in addition to carbon sequestration from forestry. The last protocol listed in the figure is the Clean Development Mechanism, which is used right now in developing countries in accordance with the Kyoto Protocol.

Question & Answer Session

QUESTION 1: Soil sequestration

I am curious about your take on soil sequestration and whether you believe it will show up in the regulatory regimes going forward.

Justin Felt

That's an interesting issue because policy has traditionally played a strong role in agriculture in the United States. As such, you have to believe that no-till agriculture is going to play a strong role as an offset in the regulatory regime. However, there have been some questions around additionality because, for instance, you'll read about farmers saying things like, "I haven't been tilling for 20 years, and now the difference is that I get a check on a monthly basis."

This brings up a lot of concerns for a cap-and-trade system that is trying to make real reductions and to utilize high-quality carbon offsets. It is difficult to address, however, because there isn't one huge farm with which you're working. When dealing with many farmers, it is not easy to individually assess each farmer's case, making implementation a critical issue.

For right now, soil sequestration does have applicability in the Chicago Climate Exchange as well as in the voluntary market, but it is not seen as a very high-quality offset and it does not garner the same prices as another project type certified through the Voluntary Carbon Standard or through the California Climate Action Registry.⁵

⁵ The California Climate Action Registry is now known as the Climate Action Reserve.

QUESTION 2: Forestry as a covered sector

There are a variety of people who have talked about the potential for bringing forests under a federal cap in the United States. Is that something that you have looked into? And, if so, what are your thoughts on whether that is a good way to deal with some of the questions you've raised or if it is politically something worth pursuing?

Justin Felt

Well, at least that would get away from some of the additionality questions. But then again, it brings up other questions because forestry is part of the active carbon cycle – the year to year basis is not really important; it's where it's going to be 100 years from now. That brings up additional questions, but at least it's a bit easier to quantify and you don't have to necessarily consider counterfactual scenarios. From a verification standpoint, it boils down to whether your carbon stock is increasing or decreasing.

Elizabeth Zelljadt

We've heard that suggestion from folks in the offset quality world, who said that covering forestry under a cap eliminates the problem of leakage. Leakage occurs when a project that reduces emissions and creates offsets in location X in turn pushes greater deforestation in location Y; entire swaths of land in the United States may go unaccounted for because the sector isn't covered as a whole. Including the forestry

sector under the cap may be the perfect tool to monitor the entire sector and not count something that, on the whole, wasn't really an offset.

One problem is how to monitor forests nationwide. It is really tricky to get these things standardized enough that the same grove of trees is monitored the same way in Maine as in Nevada, especially when the types of trees are different. It's also not favored by forestry folks because they want to be able to do offset projects where they can monetize the credits. Of course, in terms of monitoring, there are some business opportunities if it is done nationwide, but it would be a very difficult program to implement.

Canada has looked into this a lot because of the bark beetle problem, and because, for logging purposes, it is trying to get a handle on how much wood it can actually produce. It turns out to be very difficult to get any sort of comprehensive overview. So, in terms of U.S. nationwide monitoring, it would be desirable from the leakage perspective, but practically and also politically difficult.

People have also suggested that you should be able to count or receive offset credit for the degree to which a project is not standardized. A perfect example of this is methane projects. They're penetrating the marketplace more and more. It is getting easy to do methane removal projects because they have been standardized: a lot of companies do them, and the projects are now fairly easy to run. So then the question becomes, at what point is this really additional? If you're able to do a project quickly and easily and make a profit, is it really an offset project anymore? Some people have proposed only awarding offset credit to projects to the degree to which they haven't penetrated the market. If soil sequestration no-till farming is already practiced by 20 percent of the farming population in the U.S., then you should only be able to get offset credit for 80 percent because that's the degree to which it hasn't penetrated the market or hasn't become common practice. But those suggestions don't often go anywhere policy-wise because they're not concrete proposals that can be put in as part of a bill. Instead, they're a kind of overall system that requires a lot of monitoring, and those are very difficult to put into policy.

QUESTION 3: Forest monitoring techniques

As a follow-up from the previous question, what monitoring techniques for forestry are being suggested?

Elizabeth Zelljadt

This is a whole other profit-making opportunity in itself, and satellite monitoring has been developed by defense contractors. It is very useful in countries where the rate of deforestation is somewhat known; you can look at areas where you knew there were forests, and you can determine the rate at which deforestation is progressing. For the United States, it is kind of irrelevant because a lot of the deforestation isn't occurring in the dark by people who are covertly going into rainforests and chopping them down. In the United States, there are contracts so that you know exactly how much deforestation to expect and what logging company is going to do it. But on the international level, satellite monitoring technology is much more relevant.

It is also important to note that there are differences between types of forests. Forestry students would know this better than I, but the amount of carbon captured by certain types of forest – a tropical forest versus a northeast deciduous forest, for example – are different. There is thus also a need to extrapolate by type of forest and acreage, etc. Forestry experts would be needed to do that.

QUESTION 4: Additionality

Are we ever going to get over the additionality issues? Are we stuck with them?

Justin Felt

I don't know. Offsets can be amazing tools, but you never really know if the person making the decision would have made the same choice anyway. There might be ways of evaluating additionality on a kind of programmatic basis, for example, by identifying something that is not business as usual for a particular industry or seeing the use of a particular type of process.

Elizabeth Zelljadt

Proportional additionality is one solution where you look at the market penetration to provide the degree of additionality. You then make a straight benchmark for energy efficiency or emissions per dollar GDP. You wouldn't have to propose a scenario to illustrate the outcome of not doing the project: you achieve the benchmark or you don't. If you're over, you have a penalty. If you are under, you can sell the credits.

QUESTION 5: Forestry projects and the Clean Development Mechanism

Why have forestry projects been locked out of the Clean Development Mechanism (CDM)?

Justin Felt

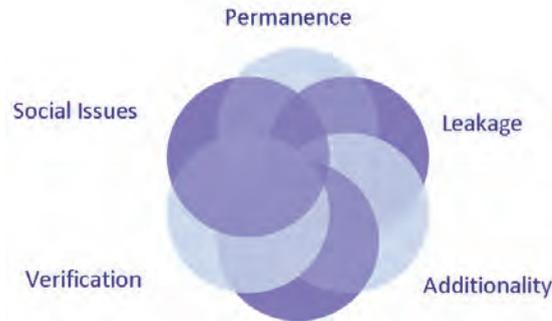
The biggest reason is because of issues surrounding permanence. Forests are part of the active carbon cycle, and there is concern over whether the reductions are long-term. When the bark beetle comes around in 70 years and destroys a forest, you would have to give back your carbon offset. This is not to say that forests are going to be locked out, but in the short-term there is a drive to learn more about them and to try to refine the methodology. From a carbon cycle perspective, 100 years, which is what Kyoto uses, is probably not long enough, but the timeframe used has to be easily implementable. Also, 100 years was a time horizon that was long enough to have either come up with a solution or to know that we're in deep trouble. The Clean Development Mechanism has tried to address the issue of permanence by creating temporary CERs that can be recertified on a continual basis, but that tends to be herky-jerky, and the market hasn't responded very well to those.

In California, the permanence issue can also be addressed via conservation easements. Of course, that's in human timelines, not geologic timelines, but it's a way to try to address the problem. Another method is to have a set of sidelines for projects. If you're producing offsets from 100 acres, for example, you may have to set aside 20

acres to act as insurance. If anything happens to the 100-acre project, reductions from the whole set-aside pool will be needed to make up the difference.

There are other problems for the forestry sector, as illustrated here in Figure 10. Leakage is actually a problem with all carbon offset projects and with cap-and-trade programs generally. A way to approach this problem is to extend the cap to cover a large expanse of forest, as we mentioned earlier.

Figure 10 Challenges for the forestry sector



Forests are part of the active carbon cycle, and there is concern over whether the reductions are long-term. When the bark beetle comes around in 70 years and destroys a forest, you would have to give back your carbon offset. This is not to say that forests are going to be locked out, but in the short-term there is a drive to learn more about them and to try to refine the methodology.

Additionality ensures that emissions reductions are above and beyond business as usual. For example, if you put up a wind turbine and it has been there for a few years, then all of a sudden you say, “Oh, it’s reducing CO₂ emissions, great – we can create a carbon offset from it,” those reductions were already happening anyway and are not additional. The turbine was part of the business as usual trajectory.

One type of additionality is determined by whether something is outside of traditional practice. For instance, if there is a new technology or technique that has not previously been used, you can argue for additionality. For forestry, additionality relates specifically to more carbon sequestration than would have happened otherwise. If the forest would have otherwise been cut down, then this project can produce carbon credits.

Verification tends to be very difficult, but with innovations such as satellites, who knows? It can be very intensive in terms of technical understanding and, if we’re talking about wide expanses of land being verified on a yearly basis, it can be expensive. In addition, these transactions can create significant social issues related to their impact on local communities, particularly indigenous communities.

QUESTION 6: Wetland offset opportunities

Some information has come out recently about the extreme climate impacts of deforestation and of forest conversion on peat or wetland soils, because not only are you removing all of the surface vegetation, but there is also so much carbon locked up in these peat soils. This was initially highlighted in Indonesia, but there is also applicability in the United States. Are there any project developers that you know of working in the U. S. to conserve either wetland or forested wetland habitats? It seems like that would be a lucrative offset opportunity.

Justin Felt

There have not been that many projects. In Indonesia, the issue is being built into a lot of the avoided deforestation projects; peat is taken into account with the methane and the carbon released. Burning peat is associated with millions of tons released. If you build that into the reductions that are sold, there are definitely some worthwhile projects. I do know Merrill Lynch has been involved with such a purchase from Indonesia. There isn't a great methodology for this activity, and wetlands are even more difficult than forested land. With wetlands we're dealing with an ecosystem, which would require an ecosystem analysis.

QUESTION 7: Post-Kyoto CDM

Post-Kyoto, is the CDM going to continue? I heard whispers that it might not, and it takes 18 months to get something pushed through. Are those projects falling through at this point?

Justin Felt

Projects are still going through. Organizations are selling CERs for 2013 reductions. Of course, they're trading at a heavy discount because there's that additional risk, but the assumption is that it is still going to go forward, and there are still projects that are being approved. That said, because of the additionality component ensuring that the sale of carbon offsets is pushing CDM projects forward, if a project has only a year or two of offsets, then obviously the pipeline of offsets could shut down fairly quickly.

Elizabeth Zelljadt

Beyond the Kyoto negotiation process, the main decider of what happens to the CDM after 2012 is the EU, because the EU has its Emission Trading System. The EU ETS was built to comply with the Kyoto targets, but by now it's grown into its own system. It had its pilot phase from 2005 to 2007. Now it's in the Kyoto phase, phase two, from 2008 to 2012. It has just announced that it's definitely going to continue emissions trading within the EU countries after 2012. This phase three is probably going to be in the period from 2013 to 2020, and it will continue with the same structure it has now. Therein lies your demand for CERs.

The question is, how will they restructure that demand? A lot of thought has gone into where the projects or credits are coming from and how countries that really need to sell CERs can get some development benefits out of it. There is some thought of possibly restricting the geographic origin of credits to the least developed countries, which would probably eliminate countries like China and Brazil. If so, that would encourage China and Brazil to actually take on targets because they wouldn't be generating CDM credits anymore.

This is the EU trying to have more influence over global negotiations by reforming its own system. It's neat because, while the EU only accounts for about 12 to 14 percent of global emissions, it's actually having more influence than it proportionally should because of its trading system and its use of the markets.

Additionality ensures that emissions reductions are above and beyond business as usual . . . For forestry, additionality relates specifically to more carbon sequestration than would have happened otherwise. If the forest would have otherwise been cut down, then this project can produce carbon credits.

Developing a Forest Carbon Market in the U.S.: A Look at the Regional Greenhouse Gas Initiative

Bryan Garcia (*Moderator*)

Program Director, Center for Business and the Environment at Yale

Alec Giffen

Director, Maine Forest Service

Alec Giffen has over 35 years of experience in natural resource planning and program administration. He has served as the Director of the Maine Land Use Regulation Commission and the Natural Resource Planning Division of the Maine State Planning Office. Mr. Giffen has also been a private consultant, working with private parties, state and federal agencies, local governments, and conservation interests to resolve disputes over land management and facility licensing. He is an avid outdoorsman and is a licensed professional forester and a registered Maine guide. He received an M.S. degree from the University of California, with an emphasis in ecology, and a B.S. degree in Forest Science from the University of Maine.

Ellen B. Hawes

Policy Analyst - Forestry, Environment Northeast (ENE)

Ellen Hawes focuses on forests and their relation to developing markets for carbon offsets, biomass generation and biofuels. She spearheaded ENE's efforts to design new forest offset protocols for the Regional Greenhouse Gas Initiative and has served on Maine's Wood-to-Energy Task Force. She received a Masters in Forestry from the Yale School of Forestry & Environmental Studies, helping to manage 10,880 acres of school forestland. She previously worked for the Climate Change Initiative of The Nature Conservancy, and she has also worked on rules for land use and forestry under the Kyoto Protocol, the World Resources Institute and the World Business Council for Sustainable Development's Greenhouse Gas Protocol. Ms. Hawes received a B.A. magna cum laude in International Relations from Brown University.

Jasmine Hyman

Director of Programs and Partnerships, The Gold Standard

Jasmine Hyman oversees the Gold Standard initiatives to boost demand for quality carbon offsets in Europe and the U.S. She previously worked on climate and sustainable agriculture issues at the Food and Agriculture Organization of the U.N. She was the head writer and correspondent for the International Year of Rice in 2004, where she wrote speeches for the Food and Agriculture Director General and varying representatives to ASEAN. Ms. Hyman began her study of greenhouse gas emission markets while doing a M.S. at the London School of Economics in Environment and Development. She earned an honors B.A. in Urban Studies at Columbia University, receiving academic distinction for her thesis, "Recipe for a Green State," which examined the economic, social, and historic influences upon state-level environmental policies.

November 5, 2008

5:00 to 7:30 p.m.

Luce Hall

34 Hillhouse Ave

Chapter 6

Developing a Forest Carbon Market in the U.S.: A Look at the Regional Greenhouse Gas Initiative

Alec Giffen
 Director
 Maine Forest Service*

Ellen Hawes
 Policy Analyst in Forestry
 Environment Northeast**

Jasmine Hyman
 Marketing Director
 The Gold Standard***

This chapter provides an overview of lessons learned from the Regional Greenhouse Gas Initiative, the first mandatory carbon emission reduction enacted in the United States. The design of RGGI's cap-and-trade and allowance auction structure represents an opportunity to test ideas and inform the national debate on cap-and-trade legislation. This chapter discusses RGGI's 5-part test for offsets in the context of opportunities and limitations of including forests as an approved offset type. Their programmatic approach represents an analysis of how to include hard-to-quantify sequestration associated with conservation in such a manner as to reduce greenhouse gas emissions, while contributing to preserving forests as forests and to improving their management.

* For more information about the Maine Forest Service, please go to www.maine.gov/doc/mfs

** For more information about Environment Northeast, please go to www.env-ne.org

***For more information about The Gold Standard, please go to www.cdmgoldstandard.org

THE ROLE OF CARBON MARKETS IN MAINE FORESTS

Alec Giffen

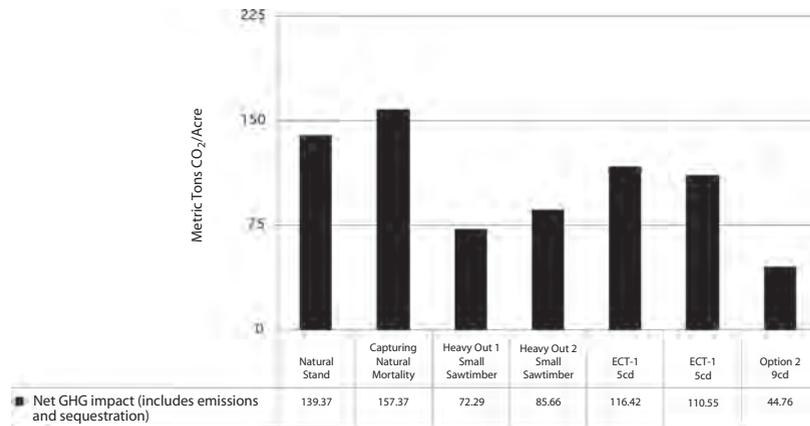
The Maine Forest Service is engaged in a collaborative effort to determine how carbon markets will affect Maine's forests. This effort involves many parties other

than the Maine Forest Service, including the U.S. Forest Service, which has contributed both expertise and funding to this effort; Environment Northeast, which has been our indefatigable partner in this endeavor; the Manomet Center for Conservation Science; and the Maine Department of Environmental Protection.

We have a small team of folks who care about the development and outcome of the carbon markets, and they have been engaged in figuring out how to deal with these markets. I don't do puzzles. I don't do board games. Instead, I do forest carbon. Understanding forest carbon is incredibly complex.

My first involvement with carbon was when I was a consultant. Environment Northeast, a nascent organization at the time, approached me to help them figure out what to include in Connecticut's climate action plan. Following this, the New England governors and the Eastern Canadian premiers took the pledge to reduce carbon emissions. This pledge, in turn, led to the development of Maine's greenhouse gas reduction plan, which involved the Maine Forest Service. We were asked for ideas as to what role forests could play in a statewide climate change plan and to model the impacts of various forest management systems on atmospheric greenhouse gas levels. We approached this mandate in a rigorous and comprehensive way. Our study of forest regimes examines changes in on-site carbon emissions, emissions associated with wood products and landfills, and avoided emissions associated with biomass burning as a substitution for fossil fuels.

Figure 1 Net carbon impacts on atmospheric greenhouse gas levels, 2003-2095

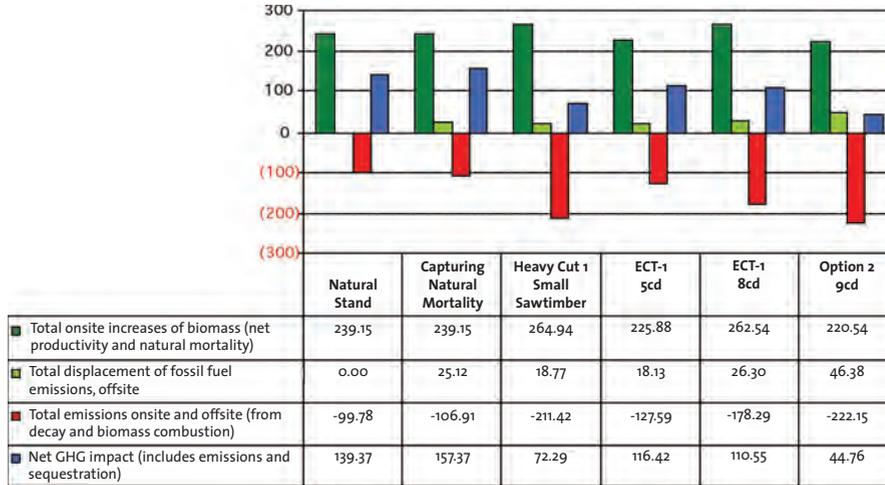


Source: *Investigating the Economic and Ecological Potential to Increase Carbon Sequestration in Maine Forests and Reduce Forest Greenhouse Gas Emissions: Phase I Report: How Management of Northern Hardwood Pole timber Stands Affects Onsite Carbon Storage and Emissions, as Well as Atmospheric CO₂ Levels*. Maine Forest Service and Environment Northeast.

Our study looked at nine different forest management regimes in Northern hardwood pole timber stands (see Figure 1 for selected management regimes). We used forest inventory and analysis data for the state of Maine to characterize stands and then “grew” the stands 90 years through a simulation model. We looked at everything from a business-as-usual scenario, which is heavy-cut small timber, to

leaving the stand alone (labeled “Natural Stand” in Figure 1), as well as a series of lighter harvesting regimes. We tracked all of the carbon sources and sinks mentioned earlier – on-site, products, landfills, etc. – and figured out what the net impact on atmospheric greenhouse gas levels would be for each management type. Figure 2 shows a breakdown of net emissions into these various components.

Figure 2 Net impacts on components of reductions in atmospheric GHG levels, 2003-2095¹



¹ Note by the authors – the amount of credit allowed for carbon stored as products seems very low, as does the credit for fossil fuel emissions avoided due to the wood substitution for other building materials.

Source: *Investigating the Economic and Ecological Potential to Increase Carbon Sequestration in Maine Forests and Reduce Forest Greenhouse Gas Emissions: Phase I Report: How Management of Northern Hardwood Poletimber Stands Affects Onsite Carbon Storage and Emissions, as Well as Atmospheric CO₂ Levels.* Maine Forest Service and Environment Northeast.

As a result of the work we did on this front, the Staff Working Group for the Regional Greenhouse Gas Initiative (RGGI) asked us to develop recommendations on how to expand the category of forest-based carbon offsets. Ellen Hawes will discuss the content of our current recommendations to RGGI.

I am also involved with the Forest Climate Working Group, a national coalition of interests based on our work in this area, as well as the effort by the American National Standards Institute to develop protocols for forest carbon projects. Ellen and I are both involved with the National Association of State Foresters, and I chair a committee in the association that has lead responsibility on these issues.

Motivations

We are motivated by the importance of reducing greenhouse gas levels. We believe this is one of the major challenges that humanity faces over the course of the next several decades and generations. We would like to build recognition of the role that forests can play in reducing greenhouse gas levels, and we want to do it in a way that provides a model for other efforts. We feel that we have come up with innovative approaches to some of the issues that plague forestry.

We also believe that the carbon markets can contribute to preserving forests as forests, and to improving their management. If an offset is supposed to account for a

ton of carbon that is going to be emitted, equivalent to an allowance that somebody could buy, then a ton of carbon should be removed from the atmosphere. This may sound simple, but if you dig into a lot of what is happening in the field and the skepticism that surrounds forestry offsets, you will find that this is not always the case. We believe that it is fundamentally important to clearly quantify offsets if forests are going to be viewed as a credible contributor in this regard, and therefore we approach forest carbon measurement very seriously. We take RGGI's five-part test for offsets qualification, which Ellen will discuss in greater detail, very seriously. Our actions are based on our view that, if forests are going to play a role, the offsets portion needs to be done very rigorously and credibly.

Importance to Maine

Forests are one of Maine's significant resources. When people think about Maine, they likely think about the coast and forests. Who can imagine Maine without the Maine woods? We are therefore passionately devoted to keeping our forests as forests, and to maintaining the value that those forests provide to the people of Maine.

The forests of Maine provide the largest unfragmented forest ecosystem east of the Rockies in the U.S. When you view a picture taken from space of the lights on Earth at night, you will see a dark hole in the Northeast. This is the north woods of Maine

We also believe that the carbon markets can contribute to preserving forests as forests, and to improving their management.

In addition to its unique ecological value, the forest products industry is the backbone of our manufacturing economy. It accounts for over \$10 billion worth of economic activity and is a way of life for Maine people. Working in the woods is part of the culture. This summer I was out in the Intermountain West, and it is really striking to drive 1,000 miles and not see a log truck or a timber harvesting operation. In Maine, harvesting and log trucks on the roads are just a part of the way that we live. Forests are also the basis for Maine tourism.

There is, of course, increased global competition in the forest products industry. There are mill consolidations and mill closings. Whole industries, such as much of the furniture industry, have moved offshore. Global competition places pressure on these industries and their ability to pay for forest products.

The future of our forests will be unlike the last century, where large tracks of forestland were owned by the forest products industry and inextricably linked to the mills. Great Northern Paper Company, for example, owned 2.1 million acres of forestland. Virtually all of those lands, with the exception of JD Irving, have been sold by the mills to maximize profit for shareholders. Changes in ownership lead to changes in ownership objectives. Grantham Management Organization bought out the holdings of one such company, and as I understand it, intends to hold these lands for about a decade. Contrast this with companies that invested in long-term silviculture and owned the land for almost a century. These changes in landowners' objectives are not necessarily good or bad, they are simply a reality that must be faced.

Additionally, we see that land values are increasing. The average piece of land in Maine grows a third of a cord per acre per year. That third of a cord is worth an average of \$15 to \$20. The prices that are being paid for land cannot be repaid by that return from timber harvesting. Land values have appreciated over time, and people

are therefore looking not only for timber returns, but also for returns from appreciation. Some parcels, for example township-sized pieces, have sold for \$1,000 an acre. \$1,000 an acre is an awful lot of money to invest in a piece of land that is producing a third of a cord per acre per year. What does that mean for future land use?

Looking to the future

Carbon markets offer several new opportunities going forward. Voluntary carbon markets represent an interesting opportunity to test ideas and to learn. We see RGGI, as I mentioned earlier, as a model. We want it to be a robust model that helps inform the national debate on these issues. Another course of action, although not necessarily the only one, would be to pursue national cap-and-trade legislation to allow for the sale of forest offset allowances. There would be a credible program for forestry offset projects in such a system. The proceeds from the sale of allowances would be used in part to keep forests as forests and to reward carbon-friendly forest management.

With that, I will turn it over to Ellen, who can talk about the substance of our recommendations.

Ellen Hawes

I am with Environment Northeast (ENE), which has been active as an official stakeholder in the Regional Greenhouse Gas Initiative (RGGI) from the beginning. Anyone can observe and submit comments, but being a stakeholder means that we have an official seat at the table. Our institutional perspective is that we want to ensure that any offsets that enter the RGGI market are credible and rigorously quantified. Right now I am focused specifically on the forest offset market. Carbon markets, if done right, can contribute to preserving forests as forests.

To echo Alec's remarks, I think the importance of RGGI is not just what happens regionally, but to serve as a model in the regulatory design process that will likely occur at the federal level in the next couple of years. We also collaborate with the California Climate Action Registry (CCAR), which is currently reviewing its forest offset recommendations. Everyone is in the position of figuring this out at the same time. A lot of people are looking at RGGI because it is actually up and running with a functioning market.

I'll provide an overview of RGGI's auctions and structure to give context to our recommendations. RGGI involves ten states and began running as of January 1, 2009. It is the first mandatory carbon emission reduction program to be enacted in the United States, and its first auction just occurred recently. RGGI allowances are already being traded.

One of the issues that RGGI is grappling with at the state level is how to use auction revenues. This is especially important now, given that many states face a budget crisis. Environment Northeast and other environmental groups lobbied strongly for states to commit to using the majority of their auction revenues for energy efficiency projects. Many states made that commitment, but have not completely finalized it in the rules. Now that there is a budget crisis, it is tempting for the states to find loopholes that would allow them to use that money elsewhere.

The forests of Maine provide the largest unfragmented forest ecosystem east of the Rockies in the U.S.

Table 1 RGGI state plans for implementation (as of October 29, 2008)

State	Allocation (tons CO ₂)	Regulation Status	% to be Auctioned	Proceeds Earmarked for Energy Efficiency	Net Program Funding for Energy Efficiency
CT	10,695,036	Complete	77%	69.5%	53.5% up to \$5,002
DE	7,559,787	Complete	60% ²	Up to 65%	39% ³
ME	5,984,902	Complete	100%	Up to 88%	88% up to \$5,002
MD	37,503,983	Complete	85%	46%	39%
MA	26,660,204	Complete	98%	Not less than 80%	Not less than 78.4%
NH	8,620,460	Complete	≥71% ⁴	Up to 90%	63% ⁵
NJ	22,892,730	Pending	Up to 99% ⁶	Up to 80%	Up to 80%
NY	64,310,805	Complete	97%	Up to 100%	Up to 97%
RI	2,659,239	Complete	99%	95% less \$550,000	94% less \$550,000
VT	1,225,830	Complete	99%	100%	99%

² Increasing to 100% by 2014

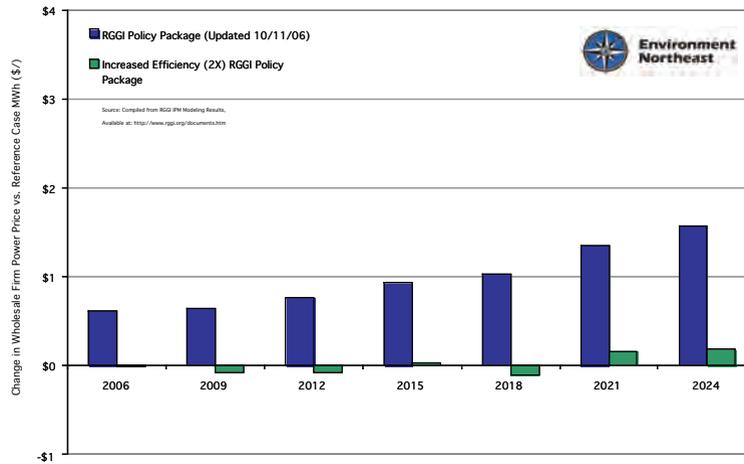
³ 39% in 2009, increasing to 65% in 2014

⁴ At least 71% through 2011, then at least 83% thereafter

⁵ Up to 63% through 2011, then up to 75% thereafter

⁶ With \$2 allowances set aside for CHP and direct allocation to co-generation

There are two items we lobbied heavily for in RGGI and would like to bring to federal cap-and-trade legislation. One is the commitment for allowances to be auctioned, as opposed to being given away, to polluters. We lobbied many of the RGGI states to commit to a nearly 100 percent auction. In Table 1, the fifth column indicates the percentage of auction revenues to be earmarked exclusively for energy efficiency. Many states agreed to large percentages for energy efficiency, at least in theory.

Figure 3 Integrated planning model forecasts of wholesale electric power price changes

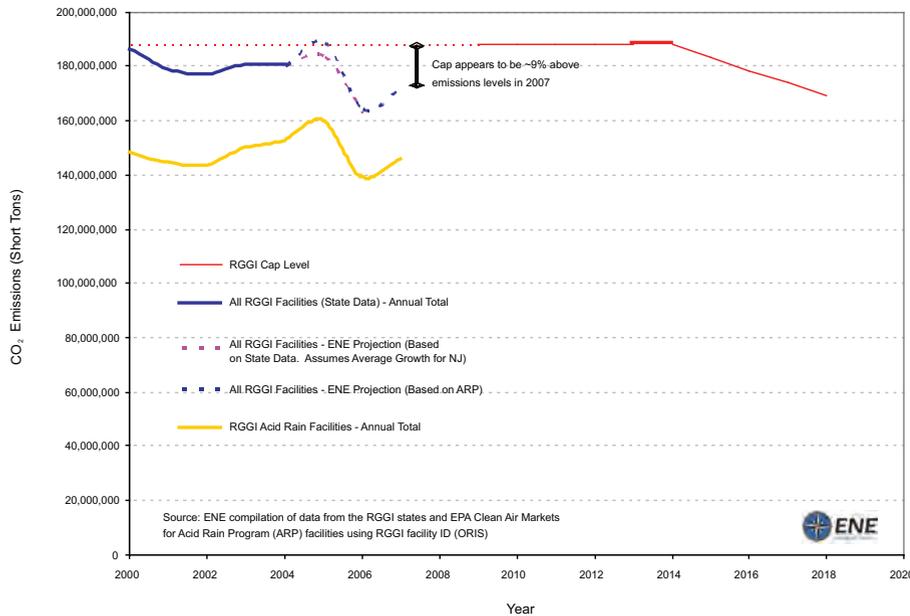
Source: RGGI IPM Modeling Results

The push for spending on energy efficiency came from a desire to keep consumer energy costs down despite a potential cost increase to utilities under a cap-and-trade system. Figure 3 illustrates the importance of getting those states to commit to using the allowance proceeds for energy efficiency investments. The higher bars are what the price of electricity would be without energy efficiency investments under a RGGI cap. The lower bars represent the price of electricity with energy efficiency investments. If the massive amounts of allowance revenues are used for energy

efficiency investments, the price of electricity can be kept from rising excessively and can even lower electricity prices in the early years. This model is built off of what has occurred with energy efficiency programs in Connecticut and elsewhere.

The RGGI cap is set initially at 188 million tons, which is meant to stabilize emissions at current levels from 2009-2014. This might be a little loose at the beginning, due to factors I discuss later, but it then ratchets down. I think it definitely will be a significant constraint on emissions in the region in later years. The 188-ton cap was the result of each state’s estimate of polluters’ emissions. Each state was given an allocation of these allowances. The states decided that it would be best, administratively, to have a regional market and regional auctions.

Figure 4 RGGI Facility 2007 CO₂ emissions from various sources compared to cap



The push for spending on energy efficiency came from a desire to keep consumer energy costs down despite a potential cost increase to utilities under a cap-and-trade system.

Figure 4 compares the RGGI cap level to actual 2007 emissions. This is based on an analysis ENE did before the first auction in September of 2008. Regional emissions have declined significantly since the program was negotiated back in 2005; therefore, the cap may be inflated in early years by as much as 9%. This is due to a variety of reasons, mainly things like weather and oil prices. While this is a positive trend that will keep prices down, there was some worry prior to the first auction that if the cap was too loose there would not be any demand for the RGGI allowances. Some of the environmental groups got the states to agree to a \$1.86 floor for the price of the allowances to address this concern about demand.

Not all of the states participated in the first allowance auction on September 25, 2008, because some were still developing their auction rules. However, all ten states are planning to participate in the second auction, which will occur in December 2008. The September 2008 auction consisted only of 2009 vintage allowances. Allowances for future vintages will begin to be auctioned in 2009.

The clearing price for the first auction was \$3.07 per ton, well above the floor price. I think most of the groups were comfortable with this initial price. It was not so high as to create panic that RGGI was sending electricity prices through the roof, but it was high enough to create some incentives to reduce emissions at the facilities required to submit allowances for compliance.

⁷ See *Critical Insights into the U.S. Carbon Markets*, this volume.

⁸ Carbon Market North America, Volume 3, Issue 21, October 31, 2008. Available online: www.pointcarbon.com.

An important thing to note is that now that RGGI allowances are trading on the secondary market, the price of Chicago Climate Exchange (CCX) allowances has gone down and RGGI prices have gone up. Some of the theory mentioned by Point Carbon⁷ and other analysts suggests that because RGGI allowances are part of an actual mandatory system, they would potentially be fungible with the federal system and are therefore worth more than the voluntary credits traded on the Chicago Climate Exchange.⁸ I do not know if prices will stay around the current \$4.15, but again this is a pretty good signal.

RGGI offsets

The first auction price was not so high as to create panic that RGGI was sending electricity prices through the roof, but it was high enough to create some incentives to reduce emissions at the facilities required to submit allowances for compliance.

There was a lot of debate over what the appropriate limit on offsets should be within RGGI, and this sort of debate will be revisited at the federal level. There are a lot of people who would like to see no limit placed on the use of offsets. On the other hand, Environment Northeast and others believe that offsets should be limited because we do not really know how the offset market will function in action and we are not completely comfortable with all of the rules governing the use of offsets, i.e. whether or not they are completely equivalent to emissions allowances. The use of offsets to meet compliance obligations was therefore limited to 3.3 percent. The rules also placed price triggers on the use of offsets. For example, if the price of allowances goes above \$7 per ton, polluters can increase the amount of offsets used to meet compliance obligations. If the price goes above \$10 per ton, the offset requirements will be loosened further.

All offsets in RGGI have to meet the 5-part test: real, additional, permanent, quantifiable, and enforceable (Figure 5). The RGGI Working Group decided to use a standards-based approach for additionality after looking at the experience of the CDM. The Kyoto Protocol's CDM uses a project-specific approach that analyzes each individual project to determine if the activity would have taken place within the offsets market financially, technologically, and biologically. RGGI looked at that approach and thought it would be very expensive to do such a complex analysis without any real assurance that it would necessarily prove additionality. So the performance standards-based approach was chosen instead. For example, the standards-based approach for afforestation simply requires that the land has been non-forest for the past 10 years as a way to prove that it is not reforesting naturally and that there are no kinds of overwhelming economic incentives for someone to go and reforest that land.

There are also some geographic limits to the use of the offsets. Right now, the RGGI states have not signed any memoranda of understanding with other states, so it is unclear whether offsets in locations outside of the RGGI region will be eligible and if so, when.

Afforestation is the only land use forestry-based offset currently approved for RGGI eligibility; see Figure 6 for a list of eligible offset types. While there are opportunities for afforestation in the RGGI region, establishing projects may not be cost-effective. Land is reforested fairly easily in New England, but the price of land may be prohibitive. The Nature Conservancy did a study and found that below \$7 a ton there really is no opportunity for afforestation. Given development pressures and the amount of forestland that is under management, I think the real opportunities for change and increased sequestration are through conservation and improved management as opposed to just afforestation.

Figure 5 The 5-point offset test – “R.S.V.P.(E)”

- **REAL** – able to quantify an actual and measurable reduction in emissions.
- **SURPLUS** (additional) – additional or surplus to reductions in emissions that would occur under business as usual activities, above and beyond what would have occurred absent any funding for the offset project.
- **VERIFIABLE** – sufficient measurement and documentation to allow independent auditors to assess and confirm project eligibility and performance.
- **PERMANENT** – be lasting, ensuring that reduction in emissions is not capable of being reversed at some future point in time.
- **ENFORCEABLE** – able to enforce compliance or require a return of the offset credit if other requirements are not met.

Figure 6 Initially eligible offset types under RGGI

- Landfill methane capture and combustion;
- Sulfur hexafluoride (SF₆) capture and recycling at electricity transmission facilities;
- Sequestration through afforestation (tree planting);
- End-use fossil fuel (natural gas, propane, and heating oil) energy efficiency; and
- Methane (CH₄) capture from agricultural operations.

RGGI administrators are willing to consider proposals for new offsets types, but they are also currently overwhelmed. They just finished the first auction and are still getting ready for January 1, 2009, when the program will become active. There are also no formal mechanisms for adding new offset types, so it is an ad hoc process at this time. As Alec Giffen mentioned, the Maine DEP and the Maine Forest Service have received RGGI’s approval to go ahead and make a proposal as to what forest management or other forest category offsets would look like. We are working to determine how the review process would work, given procedural uncertainties.

Given development pressures and the amount of forestland that is under management, I think the real opportunities for change and increased sequestration are through conservation and improved management as opposed to just afforestation.

Forest management offsets

We are focused on determining how forest management offsets in the RGGI region could meet the 5-part test and on coming up with performance standards for regional forest management. The real questions have to do with baselines and additionality. California's Climate Action Registry (CCAR) takes a legal approach, and uses the state-level forest management law as the baseline against which additional carbon sequestration is measured. We are in a somewhat different situation in New England because the forest practice regulations vary so widely between states. The method that we have been focusing on uses the Forest Inventory and Analysis (FIA) data as a way to calculate average carbon stocking in the region. We decided on FIA because it is a source of data that is equally available across all of the states in the RGGI region, and it is fairly objective and transparent. I'll speak later about some of the challenges of figuring out how to use that data.

We are also working to clearly define permanence rules as they apply to forest management. RGGI requires that afforestation projects be permanent; the rules actually require there to be a permanent easement on the property. We are looking at defining "permanence" to mean 99 years, which is a little bit easier to deal with practically and legally.

Since there is interest in forest management offsets among conservation groups and larger landowners, we are working to outline permanence structures that could accommodate a diverse set of participants. Could there perhaps be some sort of rolling enrollment so that an aggregator, or a land trust as an aggregator, could enroll a group of small landowners on a rolling basis? Maybe you would not need to require every single landowner to stay in for 99 years as long as the pool is consistent. There are some complications in figuring out how that would work, but we are definitely interested in continuing that discussion and exploring that option.

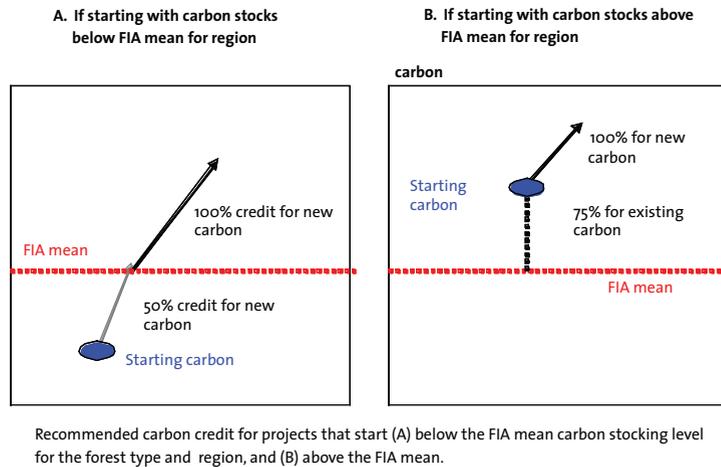
Leakage is another big question in defining forest management standards. If one landowner is increasing carbon sequestration by extending rotations or decreasing harvesting, there might be another landowner who is going to increase harvesting on his or her property as market signals dictate. We struggle with how to quantify these opposing management practices. A lot of theoretical modeling has been done, but right now there is no data analysis that looks at elasticity of demand between different types of timber products in the region and the pricing. We would like to get that research up and running, but it is an issue of funding and time. There might be some money in Maine that could potentially be dedicated to that sort of research once RGGI allowance revenues begin to flow. Pending known leakage percentages though, we are thinking of initially requiring that a project maintain some sort of standard harvesting rate that it is not suddenly changed. We might use FIA data to establish levels of timber removals. We have also talked about requiring certification, because land enrolled in certification projects has long-term management plans and is managed according to sustained yield. Certified forest stands will therefore at least maintain a steady level of harvesting through the life of the project.

Figure 7 illustrates some of the details of our proposed baseline and additionality requirements. The dotted line is the mean carbon stocking for the region based on

If one landowner is increasing carbon sequestration by extending rotations or decreasing harvesting, there might be another landowner who is going to increase harvesting on his or her property as market signals dictate. We struggle with how to quantify these opposing management practices.

FIA data; our requirements would basically require a project to meet this level before it can earn full credit for new carbon sequestration. Landowners would be required to measure the initial amount of carbon on their land – that would be the baseline. Crediting would be based on a comparison of individual baselines and the state average for that type of forest.

Figure 7 Proposed forest management offset crediting for RGGI



We initially talked about crediting only those projects that start above the mean, but we thought it would be better to structure the standards such that projects that started below the mean have some incentive to engage in sequestration. Therefore, as Figure 8 shows, there is an incentive, albeit a discounted one, for projects that start below the mean. Once a project passes the mean, the project owner will receive 100 percent credit for sequestration. On the flip side, a project that is already above the mean receives a discounted amount of offset credit for committing to maintaining existing carbon stocks above the mean.

The percentages we assigned to crediting are somewhat arbitrary. The final decision will be a political one. We simply claim that the FIA mean is the performance standard, and so a forest owner whose land is above that standard should be able to get credit if those stocks are maintained. This is to ensure that carbon stocks remain high in those stands that already exceed the standard. Generally speaking, carbon stock goes up and down in a managed forest as trees grow and are harvested. Therefore the crediting proposed in Figure 8 is an attempt to encourage landowners to maintain already-high carbon stocks on eligible lands for the 99-year “permanent” period. Lands that have had management plans leading to fairly low current carbon stocking levels are then given a little bit of an incentive to get up to the standard level, and then go even farther than the mean if possible.

We are now trying to resolve some more detailed aspects relating to the FIA data. For example, what is the best way to classify properties to come up with a performance standard? There might be underlying biological differences in

productivity and forest type on different sites that would influence carbon stocking levels which have nothing to do with past or current management behavior. Carbon stocking, to some degree, simply reflects the underlying site qualities, which should be factored into establishment of the average stock and the resulting carbon credits. Geopolitical boundaries are one way to engage legal and tax incentives in furthering sustainable forest management, which is why we suggest policymakers take in-state data. However, we must also look further. There are different ways to classify that data within a given state according to things like site quality or forest type.

We are now exploring the possibility of using eco-regions as one filter.⁹ While it sounds good in theory to classify the data by different levels – county, forest type, and soil type – once we get down to that level we do not have enough data to calculate a statistically reliable mean. We have to balance the number of data points we have with the attempt to get really accurate with the group property classification.

Reduced impact development and urban and community forestry

We have some proposals for forest offset types in addition to forest management that we think may have potential. One idea is reduced impact development, which would try to reduce the footprint of developments rather than just enclosing a piece of forest and conserving it forever. This would involve determining the average amount of site disturbance and forest clearance associated with a given type of large-scale development, and then applying some sort of clustered development model instead. The developer would then commit to preserving the undeveloped portion of the forest in perpetuity. We are trying to determine if it would be possible to quantify the difference in impacts and get some credit for it. We gravitated to this approach because it seemed to be an attractive way to deal with leakage. Avoided deforestation has traditionally been thought of as a form of pure forest conservation, but protecting a piece of forest from development does not mean that the developer isn't simply going elsewhere. We like the idea of actually reducing the amount of clearing associated with development rather than just displacing it.

I think conserving forests from development is really one of the most important things we can do in New England to increase sequestration and reduce forest emissions, but it has been a challenge to fit into an offset category. It is easy to demonstrate increased carbon storage above a baseline level with afforestation, because you start with flat ground and plant trees. Preserving a forest from development, however, is a future scenario that has not actually happened, and so it becomes much more complex and difficult to show that prevented deforestation is deserving of a carbon credit. There are a lot of land use models out there that can model where development would happen, but there is definitely controversy and a lack of consensus over those sorts of methodologies. Therefore, we are not currently proposing this as a priority offset category. It definitely has value, but we do not want to distract from what we have been able to come up with on the forest management side. Furthermore, we have been talking with other groups on the federal level that have been gravitating toward a non-offset, programmatic approach that may be able to incorporate reduced impact development.

⁹ See: R.G. Bailey and C.T. Cushwa, *Ecoregions of North America*, Washington DC: U.S. Fish and Wildlife Service, 1981

I think conserving forests from development is really one of the most important things we can do in New England to increase sequestration and reduce forest emissions, but it has been a challenge to fit into an offset category.

Another important category of offsets is urban and community forestry. This would entail tree planting and reforestation of urban parks and is attractive to states other than Maine. Northern New England is really the only area in the RGGI region that has large forested areas and a big timber management industry. Some of the other states are more urban forestry and do not have such large timber management blocks, so this would be a way to engage smaller forest plots. The details would not be too complicated, but the carbon storage levels would be much smaller when you are planting a few trees in a city as opposed to changing management over thousands of acres. Therefore, I don't know what the real opportunity for urban forestry is, but it is certainly worth developing a project protocol. People are working on protocols for this in California and on the federal level.

Forestry offsets on the national stage

We are looking into a programmatic approach as a way to legitimately include hard-to-quantify sequestration associated with conservation. The Lieberman-Warner Bill – the federal climate change legislation that was proposed this past session and has been used as a framework for what could come out next year – allocates allowances from the program to a number of different sectors, including forestry. This system allows for forest offsets, but also has a funding mechanism for the forest sector that is derived from the sale of allowances at auction. That sort of money can target forest conservation and similar projects, but it does not detract from the emissions cap. If the program uses an offset, on the other hand, it essentially allows an extra allowance into the system. If that offset is not completely credible and quantified and equivalent to that allowance, then it weakens the cap. If allowance auction revenues are used to fund conservation or improved management in the forest sector, on the other hand, that is just gravy.

The challenge on the federal level, then, is that everyone wants a piece of the potentially billions and billions of dollars going into the public kitty. I think one of the weaknesses of the Lieberman-Warner proposal was that it allocated money and allowances to many different groups. Everyone has a valid claim to that money, and so the forest sector has to make a strong case that it deserves that money as opposed to, or in addition to, agriculture, wildlife adaptation, coastal relocation, and all of the other things that need to be done to address climate change in the country. For example, the proposed RGGI cap is 188 million allowance tons. The maximum quantity of offsets allowed in the system is 3.3 percent of that. This could translate into \$18.6 million each year if offsets and allowances continue to be traded at around \$3.00 per ton. That would be the money available for all of the offsets out there, so there is no guarantee that forest offsets would capture any of that money.

Forest offsets are a very small percentage of total offsets registered internationally because they are seen as more complex and controversial than some of the industrial projects. The European Union Emissions Trading Scheme does not even allow them to be used for compliance. I think this exclusion has had a big impact on the number of forest projects that are happening under the European Union system. Even though forest projects might not be as financially attractive as other project types, there are

co-benefits associated with them, like biodiversity and water quality. I think these characteristics makes it attractive for companies to invest in forests.

A quick back-of-the-envelope calculation can illustrate what forest offsets, based on our FIA average carbon stock approach, might mean to an individual landowner in Maine. A landowner who currently has 30 tons of carbon dioxide per acre above the FIA mean stored across 500 acres could receive an up-front payment of about \$33,000, assuming a price of \$3. It is very difficult, however, for a landowner to commit to maintaining the stand for 99 years. The landowner also has to assume project monitoring costs and deal with the bureaucratic nightmare of reporting to RGGI and submitting land to audit by third-party verifiers every five years. The payment for sequestration is definitely an amount of money that could encourage different behavior, but it is not yet clear that that amount of money is worth the other requirements that come with an offset project.

Summary

Alec Giffen

The payment for sequestration is definitely an amount of money that could encourage different behavior, but it is not yet clear that that amount of money is worth the other requirements that come with an offset project.

I want to underscore a couple of things that Ellen Hawes said. Some of the things that bedevil forestry offset projects are leakage and additionality. We are dealing with leakage in active forest management projects by saying that landowners must continue to harvest. We are proposing that that be done using the FIA data in the same way that Ellen is looking to define what is business- as-usual. We get at the additionality issue by saying that the FIA information, properly parsed, essentially provides a statistically valid measure of what really is business-as-usual management. These are two things that differentiate what we are doing from what others are doing.

Ellen mentioned our frustration in figuring out how to deal with straight conservation easement projects because of potential development leakage onto other parcels. What she did not mention is that we have had some conversations with Dr. Brian Murray at Duke University's Nicholas School of the Environment, who is considered to be one of the international experts on this topic, about whether or not he could undertake some research to help us estimate the elasticity of supply and demand curves in a way that would allow us to frame that issue. We would like to have a proposal for including straight conservation easement projects however, consistent with our overall approach, it has to be something that is rigorous and that we can defend by guaranteeing that "If you pay for a ton under an offset program, a ton is removed from atmosphere."

I see the programmatic approach that Ellen mentioned as having huge potential benefits since it would enable us to reduce atmospheric greenhouse gas levels down below what is mandated by the cap because those forestry projects would be in addition to required emission reductions – "gravity," as she put it. It would not be the same as an offset; rather, policymakers would use the proceeds from the sale of allowances to get carbon levels down even farther. Because of that, the approach does not need to be as rigorous as it is for an offset.

Finally, we recently had some contact with one of the timber investment management organizations that is active in our area. They did an analysis looking at

returns from participating in the Chicago Climate Exchange (CCX) and returns from participating in RGGI using the approach that we outlined here. They applied the standards that we suggested and the CCX standards to particular properties that they owned, and then played it out over time. They found that if the RGGI markets develop in the manner they expect, then using the RGGI offset standards would make a difference in terms of their interest in pursuing acquisition of certain forestlands in Maine and in the region as a whole, because it would increase their rate of return over what could be achieved with CCX standards. That was really very encouraging to us, and we are going to have further explorations with them regarding their findings.

Question & Answer Session

QUESTION: Comparing methodologies and lessons learned

Jasmine [Hyman], we had a discussion earlier about energy efficiency and renewable energy in developing countries and how we might look to monitor and evaluate how some of those projects would receive carbon offsets and credits through the CDM and voluntary carbon markets. Here today we have heard about the Maine and RGGI programs, where the FIA mean is the performance basis and the proposed requirement of 99 years for permanence. What are some of the challenges that you see in terms of establishing a methodology for determining whether the forest offset quality assurance under RGGI is real?

Jasmine Hyman

I think that Ellen and Alec did a really excellent, nuanced, and honest job of presenting the challenges associated with forestry credits. I have to say that, from the Gold Standard's perspective, one of the criticisms we get about our standard is that it is too complicated. On the other hand, I think the Gold Standard is a piece of cake compared to forestry. The issues that Environment Northeast raised would be precisely the same ones that the Gold Standard would look at if we were to expand to forestry. Honestly, this is something we have not done. We focus on renewable energy and energy efficiency, but are open to the idea in theory. However, it would take considerable resources and considerable human capacity in order to further flesh out these issues.

The first thing that comes to mind is – at what point does a forestry credit become a credit? I really appreciated the five points that Ellen mentioned – additional, permanent, quantifiable, real, and enforceable. I would say there is a sixth point, though, which is financially viable. If the price of land is quite high and if it is much simpler to go for a methane-to-energy project, how do we level the playing field so that a forestry credit actually makes sense? The issue of competing uses for land stuck me.

The closest parallel I can draw from my experience is that one of the Gold Standard principles is to use conservative accounting methods. When in doubt, give fewer credits. We have a cook stove methodology that uses renewable biomass. Being able to monitor whether or not that biomass is actually renewed, even on such a small

scale as a cook stove project, has proven to be very, very difficult. We abide by the United Nations rules, so if there is a 10 to 50 percent margin of error, we assume 15 percent. I am curious as to how one would deal with monitoring forests – how that would actually work from a practical standpoint and how that could make financial sense for a project proponent.

I voice these concerns with a great deal of humility. The Gold Standard will really be looking at organizations such as Environment Northeast to learn from their experience as to what works in the forestry sector, because I do not think that there is any dispute that forestry is an extremely important area for climate change mitigation.

Another issue that I didn't hear touched upon, although I am sure they considered it, is the issue of people who manage forests themselves. One of the principles that we really abide by in the Gold Standard is the idea of bottom-up participation in the design of a project, and taking an integrated approach to looking at how the project will affect local people. I think these are issues to consider when we talk about leakage or the elasticity of demand – whether or not reducing harvesting in one area will increase harvesting in another. It is that kind of consideration that the Gold Standard would really want to monitor. We do social, economic, and environmental screens that ask a whole host of questions about a project in order to get a sense of the kind of secondary impacts there that may go beyond just the mitigation itself.

Those would be some things that we would look at, or actually where we would first look to organizations like Environment Northeast and the Maine Forest Service for answers.

Ellen Hawes

To respond to Jasmine's comment on complexity, even though I think my graph and explanation of the FIA data seems complicated, it is in fact all publicly available data and it would be fairly easy for state forestry agencies to calculate baselines for each state. In a state like Maine, there are perhaps five major forest types in two ecoregions, so there would be ten potential baselines for Maine. A landowner would just find where he or she is on the map, and that would be the baseline. So an individual project is actually fairly simple. A landowner would still have to go out and measure and stratify the forest and collect all of the data, although very large forest properties that are managed intensively would already have an annual inventory set up. There are some questions as to how to include additional carbon pools that are not standard timber inventory pools.

Regarding the measurement and monitoring of forests, RGGI already has all the rules set for afforestation projects. I think the acceptable error rate is around 10 percent, so we would probably stick with that approach. Right now it looks like a lot of the groups that certify or audit the Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) properties may be moving into carbon measurement as well. It would be great if the two certifications could be integrated so that one person comes around every five years and does the FSC audit at the same time they do the carbon audit. That, I think, would be one way that monitoring could potentially be financially viable.

Alec might have more insight into the issues regarding local populations. It is always interesting, intellectually, to think about things like FSC and some of the carbon protocols that are built internationally and have that sort of local, indigenous community focus and buy-in, and then apply them to the United States. A lot of people working in the U.S. are just not used to thinking in that way, and I think it can be challenging. I think even with the Yale Forest being FSC certified, you need to have meetings with the neighbors to explain what that means. In general, though, I do not think that the RGGI offsets program requires project owners to consult with local stakeholders or anything along those lines.

Alec Giffen

It is really fairly simple and straightforward to apply the rules to an individual project. We are saying that business-as-usual for managed forests is the FIA mean for a given forest type and region, and we are going to reward landowners for either getting up to that mean or getting above it and maintaining carbon stocks over the long term. We are going to deal with the leakage issue by saying that landowners have to maintain harvest, which is something that other programs do not do. It is really not that complicated to figure out how it would apply to a particular project. It is the thinking that went into the guidelines that has been quite complicated.

In terms of monitoring, people periodically do an inventory of their lands and they take stock of the trees as part of standard forest management. I am not saying that there would not be any changes that would be needed to fully account for carbon, but it would be add-on to something that is already being done for many forest parcels. Some of the transaction costs could be rolled into the cost of normal forest inventories. In terms of permanence, some landowners are interested in things like a commitment to a 99-year conservation easement. In the timber investment management organization (TIMO) that I talked about, their business model is interested specifically in projects that have a conservation component, and they are looking for parcels that have that kind of value.

I think we are dealing with the issue of secondary impacts by asking project owners to maintain harvest levels, which is where the impacts would come from, and by calling for sustainable forest management through a recognized program that is already accepted by the marketplace. As Ellen says, the certification programs were really designed for other areas of the world where it is a much more important problem. I was recently reading some case studies on this topic that dealt with Honduras and one of the African countries. They are dealing with a situation where the government and native peoples still have not worked out land ownership. We have a much more highly developed system that delineates who owns what and how it gets managed. I think the secondary impacts can really be dealt with through a combination of required maintenance of harvest levels and the requirement for sustainable forestry. This will allow for continued employment and supply of raw materials.

U.S. Forest Carbon Policy: The Role of State and Federal Governments

Laurie A. Wayburn

*President and Co-Founder
Pacific Forest Trust*



March 30, 2009
4:00 to 5:30 p.m.
Burke Auditorium, Kroon Hall
195 Prospect Street

Laurie Wayburn has more than 25 years of experience in the conservation and sustainability fields. Considered a preeminent authority on U.S. forests and their climate benefits, she is a leader of regional, state and national efforts to enact climate change policies that unite forest conservation and management with market-based incentives to reduce carbon dioxide emissions. A frequent speaker and writer on the climate role of forests, she is the author of “Forests in U.S. Climate Policy: A Comprehensive Approach” (Lincoln Institute for Land Policy 2009), and co-author of “America’s Private Forests: Status and Stewardship” (Island Press 2001) and “Forest Carbon in the United States: Opportunities and Options for Private Lands (Pacific Forest Trust 2000).”

Ms. Wayburn is a recipient of the 2009 U.S. EPA Climate Protection Award, the 2008 James Irvine Foundation Leadership Award, the Land Trust Alliance’s 2008 Kingsbury Browne Conservation Leadership Award and the 2007 Forest Leadership Award, all highly prestigious honors bestowed for her leadership in advancing incentive-based conservation and climate solutions from forests.

After earning a B.A. in Biology and Geology from Harvard College, Ms. Wayburn worked for the United Nations’ Environment Programme and later with its Man and Biosphere Programme. She later served as the Executive Director of the Point Reyes Bird Observatory and was coordinator of the Central California Coast Biosphere Reserve before founding the Pacific Forest Trust with Connie Best in 1993.

Chapter 7

U.S. Forest Carbon Policy: The Role of State and Federal Governments

Laurie Wayburn, President and Co-Founder
The Pacific Forest Trust*

This chapter takes a look at the role of forests in the global carbon balance and the legislative elements that should be put in place to encourage a baseline “no net loss” of stored carbon. The author considers the U.S. political framework in particular, and walks readers through forests’ treatment and function under California’s Global Warming Solutions Act. She asserts that federal forest carbon legislation should cover both private and publicly managed lands, and will likely be overseen and funded by several regulatory bodies. The author uses the Pacific Forest Trust’s 2,200-acre Van Eck Forest Project in Northern California as a model for successful implementation of a forest carbon project that utilizes improved management for sequestration and avoided deforestation to generate credits that are currently being sold into the marketplace. Holistic federal regulation of the forest sector could create opportunities for similar projects around the country.

* For more information on The Pacific Forest Trust, please go to www.pacificforest.org

INTRODUCTION

The focus of The Pacific Forest Trust is to find ways to align ecological needs with economic realities. We do not see an effective way to separate environmental science, policies, and markets. As such, we focus on developing new markets for conservation and climate as a key vehicle for conserving working forests in the United States.

Today I will focus on what we are trying to achieve with the forest sector with regards to climate policy. I will review a few fundamental facts about forests as an emissions sector, discuss the impact of land use change and the flow of forest carbon, and then describe some of the points around national policy as they relate to public

and private forests, including some model approaches at the state and project levels. I will close with some caveats.

FORESTRY AND EMISSIONS

People tend to think of forests as a resource for carbon sequestration, but they are also a key *source* of greenhouse gas emissions. Climate policy therefore has to include the downside of the forestry sector as well as the upside. Moreover, because forests affect so many other sectors – from energy to transportation fuels to waste to construction and manufacturing – you need to integrate the accounting for the forest sector with that of the fossil fuel sector. That said, over the next 50-plus years, forests can contribute 20 to 25 percent of the U.S. emission reduction targets and expectations that have been set.

We need to manage for climate across the landscape, not simply within any individual tree. Thus the issue of co-benefits must be integral to the accounting system that we use. Major co-benefits include increased adaptation and resilience, alternative sources of energy, smarter growth, and sustenance of other ecosystem services, such as water and habitat.

Accounting for carbon

Forests affect the overall carbon balance in several ways. Reducing forest loss is key both domestically and internationally, as is restoring the forest carbon banks that we have in this country, which are some of the largest in the natural history of the world. Reforestation, reducing deforestation, and restoring forest carbon banks must be done together in a way that looks at how carbon is embedded in the landscape, not simply how carbon is accounted for as a unit.

We do not want to manage for climate the way we manage for lumber. We need to manage for climate across the landscape, not simply within any individual tree. Thus the issue of co-benefits must be integral to the accounting system that we use. Major co-benefits include increased adaptation and resilience, alternative sources of energy, smarter growth, and sustenance of other ecosystem services, such as water and habitat.

If this is the goal we are seeking – and I think there is broad agreement in the policy world that what we really want out of forests is net emissions reductions that can be applied toward other emissions caps – then we have to realize that there are actually many different ways to achieve that goal. People tend to think of cap-and-trade as the only approach, and so they want to know what role forest offsets will play in that system. I would suggest that cap-and-trade should be but one piece of the discussion.

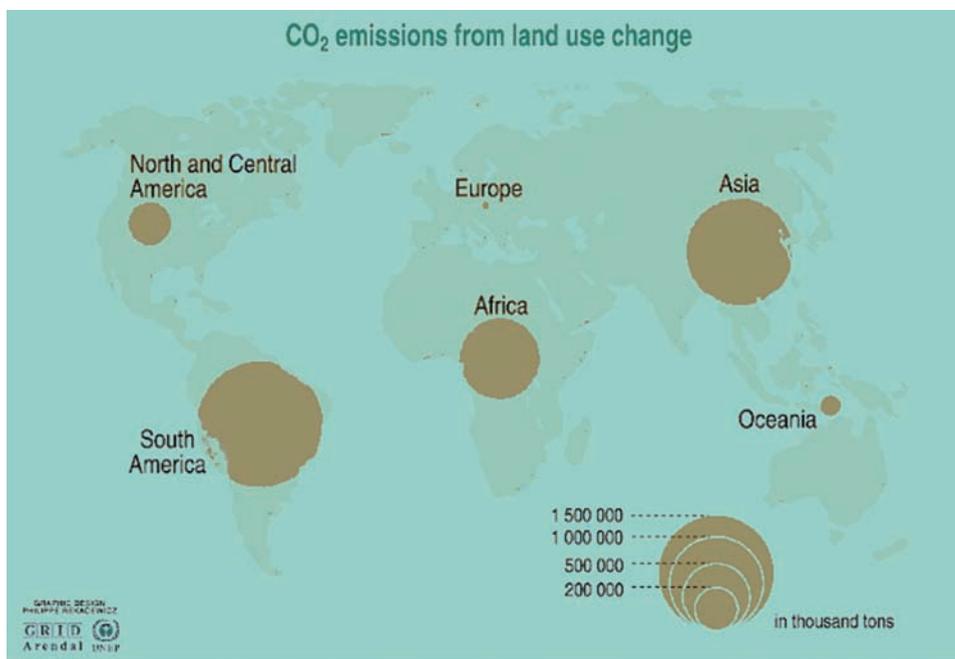
The Farm Bill has significant influence on this discussion, as do public land management appropriations of the Department of Interior regarding national energy concerns. The Transportation Bill may end up being the single most effective funding mechanism that we have, while existing programs and authorities like the National Environmental Policy Act (NEPA) and the Clean Air Act guide how we will actually deliver under a cap-and-trade system. To use a metaphor, if we look at cap-and-trade as being the pot of gold, we have to think of these other mechanisms as essential to creating the rainbow.

THE IMPACT OF LAND USE CHANGE

Global and historical patterns

Land use and land use change currently contributes 20 to 25 percent of global greenhouse gas emissions, more than the amount created by the transportation sector. Forest loss and change is responsible for well over 90 percent of land use change emissions. Figure 1 illustrates where carbon dioxide (CO₂) emissions due to land use change are coming from today. These emissions arise primarily from cutting down forests. Land used for agriculture or development has considerably less capacity to store CO₂.

Figure 1 CO₂ emissions from land use change²



² CO₂ emissions from industrial processes and land use change. (January 98). In UNEP/GRID-Arendal Maps and Graphics Library. Retrieved 09:45, November 1, 2009 from http://maps.grida.no/go/graphic/co2_emissions_from_industrial_processes_and_land_use_change.

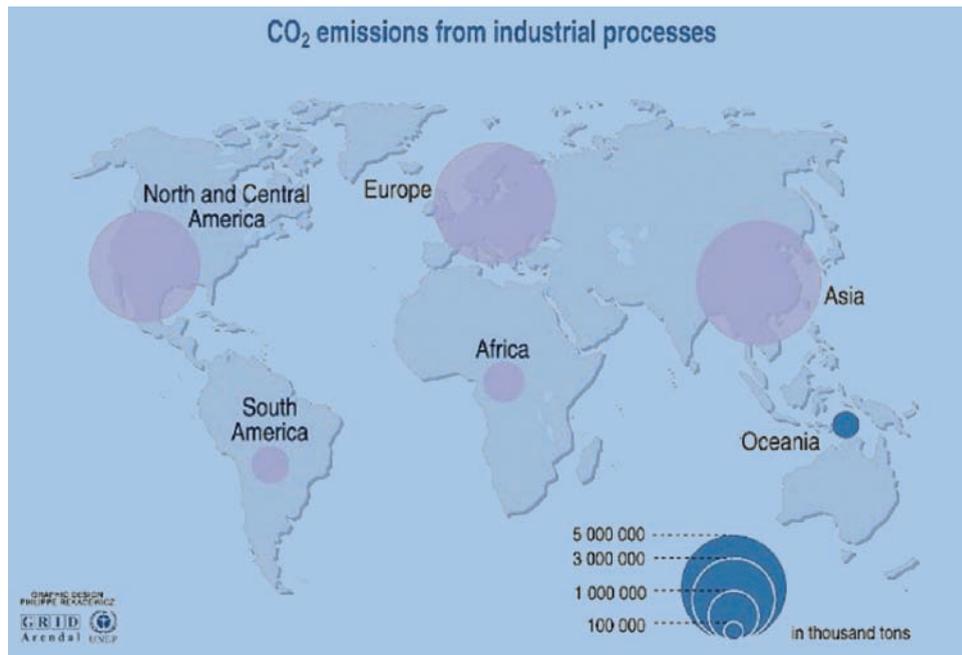
Land use and land use change currently contributes 20 to 25 percent of global greenhouse gas emissions, more than the amount created by the transportation sector. Forest loss and change is responsible for well over 90 percent of land use change emissions.

Figure 2 shows emissions from industrial processes. The vast majority of emissions in the Americas come out of North America, with much lower levels of carbon being emitted from South America.

Notice that, within the Americas, North America is a major emitter from industrial processes but a small emitter from land use change, while South America has minimal industrial emissions but is the largest source of land use change emissions in the Americas and, indeed, the world. This picture would have been very different 100 years ago. North America's forest emissions would have been much greater, whereas South America's volume would have been relatively small. The United States now has the opportunity to pull back into our forests the CO₂ that was emitted from them in the past.

³ Ibid.

Figure 2 CO₂ emissions from industrial processes³



We lose 1.5 million acres of private forests annually in the United States. Moreover, the overall carbon stores on our forestlands are, on average, somewhere between 10 and 50 percent of what those forests can naturally hold. There is therefore great opportunity here in the U.S. to increase our net stocks of forest carbon and increase a sustainable flow into wood products.

This also shows that we need to address fossil fuels and forests with an integrated approach if we are going to be successful both domestically and globally. The greatest need in the tropics is to conserve the forest base. This would have the single biggest impact on reducing forest emissions globally. Forest landowners in the United States, however, need to conserve existing forests as well as restore lands through use of different management practices. Just as forests are a third of the earth's land base, they are also a third of the United States. It could be hugely positive if we marshal our forces to increase net sequestration and decrease forest loss.

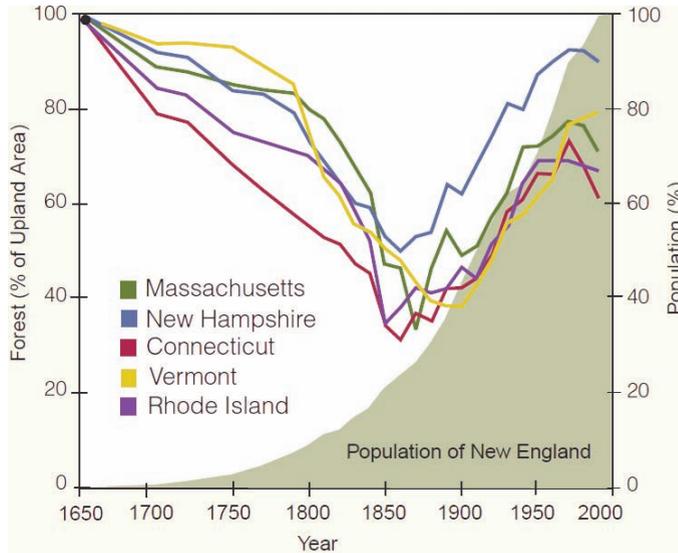
The United States: Part of the problem and the solution

We lose 1.5 million acres of private forests annually in the United States. Moreover, the overall carbon stores on our forestlands are, on average, somewhere between 10 and 50 percent of what those forests can naturally hold. There is therefore great opportunity here in the U.S. to increase our net stocks of forest carbon and increase a sustainable flow into wood products.

New England is indicative of the state of U.S. forests.⁴ It is true that, while there was massive deforestation in New England and across the country until about the start of the Industrial Revolution, more land is forested now than was at the turn of the twentieth century. As Figure 3 illustrates, however, we are now once again in the midst of steep deforestation due to development, even in New England, an area famous for regeneration. Although development pressure might ease with the collapse of the housing market, the population will almost certainly continue to increase over the coming years, and we will continue to lose land. This is true across the country.

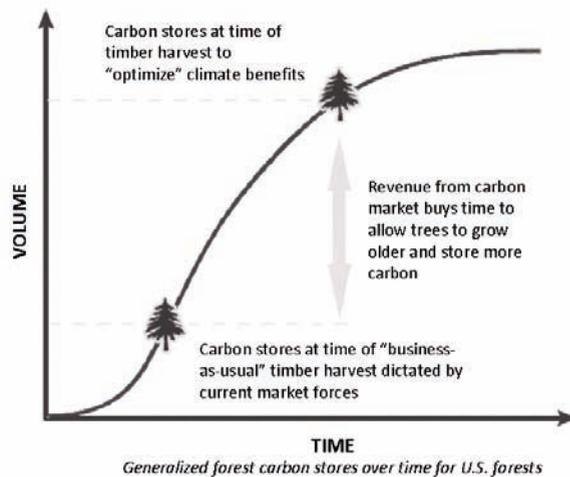
⁴ Foster, D.R. and J. Aber. (Eds). 2004. *Forests in Time: The Environmental Consequences of 1000 Years of Change in New England*. Yale University Press. New Haven, CT.

Figure 3 Historical change in forest area and population in New England (1650-2000)



So, reducing forest loss is one opportunity for the United States. The second opportunity is to optimize how we manage forests for storing carbon in the forest and in forest products. Figure 4 shows the general growth curve of forests as created by The Pacific Forest Trust. It illustrates that we are far from the sweet spot of managing our forests to both accumulate more CO₂ and hold it, and to maximize sustainable yields of timber. The fundamental reason that we tend to harvest earlier as opposed to later is the time value of money (see Figure 4). If we can inject money into a system that enables landowners to hold forests longer, we can move ourselves further out on the curve, and benefit climate as well as sustainable yields of timber. That is a key mechanism that we will be reviewing in terms of policy.

Figure 4 Generalized forest carbon stores over time for U.S. forests



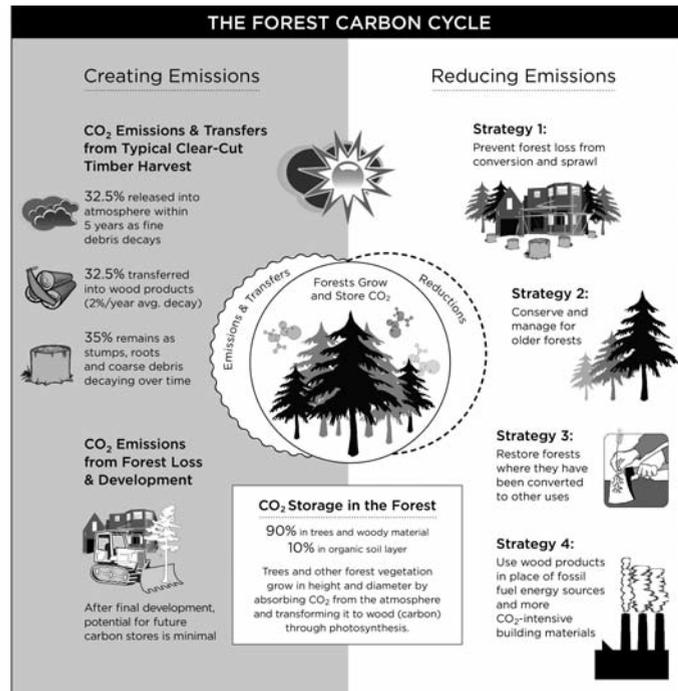
The finding I just described has been replicated in eddy flux studies all over the country. These studies tell us that forests will continue to absorb more and more carbon over a substantially longer period than traditional wisdom holds. Moreover, the projections are that this steady increase in uptake will continue for at least another five, and perhaps another 10, decades. We therefore have 50 to 100 years where we could be making positive changes.

THE FLOW OF FOREST CARBON

It is also critical to address the flow of forest carbon and how forests impact other sectors. We are all familiar with the intake of CO₂ through photosynthesis, but what are the transfers that take place after that, and where are there opportunities in those transfers to make net gains in sequestration?

As shown in Figure 5, roughly a third of carbon in a clear-cut forest gets released in the first five years after a cut, as the fine debris decays. Approximately one-third gets transferred into wood products. It is possible to increase the harvest efficiency to 40 percent, but going beyond that is difficult and often much less than a third of stored carbon can be converted to merchantable product. The remaining third remains in the forest as stumps, roots, and coarse debris. These remains will decay at different rates depending on how the forest has been managed. Exposure has a big impact here: canopy openings will tend to increase the rate of decay, while cover will tend to decrease it.

Figure 5 Tracking forest carbon: the full cycle – gains, transfers, and losses



Strategies for changing current dynamics

The strategies for changing the net dynamics of forest carbon emissions are fairly simple. Reducing forest loss, conserving and managing for older forests, and restoring forests in areas where they formerly existed, such as along the watersheds of the Mississippi and Missouri Rivers, would have enormously beneficial effects.

Another strategy that is discussed is the substitution of wood products for more carbon-intensive construction materials. For example, if less carbon is emitted in the production of a wood product than is released in the production of a cement product, and these two products are fungible, then the total carbon emissions to the atmosphere theoretically would be diminished by substituting the wood product for the cement product. This is a very interesting but also somewhat problematic approach in that it is difficult to monitor. Science tells us that, generally, substitution may not make a big difference for the carbon balance over the next 100 years, but it may have very beneficial effects in the first few decades of the following century. We may therefore want to pursue this strategy regardless of the net outcome over the first 100-year time period.

FEDERAL LEGISLATION

Given this situation, what would a U.S. version of REDD – the United Nations Collaborative Program on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries – look like? It would have to reduce loss, restore depleted stocks, and reforest. Addressing all of these factors is too complex for a cookie-cutter approach. This is one of the challenges facing federal legislation. A one-size-fits-all strategy will not work, making regional differences extremely important. There is also the potential for huge differences between how we treat public lands and private lands.

National approach

The national approach that The Pacific Forest Trust advocates, along with a number of other organizations and landowners, is called “no net loss.” This approach stems from our belief that forests are critically important to the United States in terms of meeting a national emissions reduction target. Through their absorption of CO₂, forests currently reduce our net emissions by about 10 percent. This is a 10 percent loss from the level of sequestration during the Clinton administration. While accounting changed over that period, there is no doubt that we now sequester less on a net basis in the United States than we did 15 years ago. If we are to meet the reduction targets we expect to see established, we cannot afford to lose any more forestland. Policymakers are looking at the market to create net gains, but we need to have a floor of no net loss in order to establish what “net gains” actually means.

Our strategy requires integrating forests into the regulatory system using incentives and market forces to drive gains, combined with regulations to stem or mitigate losses. Within that system, it is critical to set the right rules. There has been

Given this situation, what would a U.S. version of REDD – the United Nations Collaborative Program on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries – look like? It would have to reduce loss, restore depleted stocks, and reforest.

an enormous amount of debate about what those rules should be for forest offset projects, which currently attempt to address sequestration loss with a scattershot of voluntary activities. Governing and tracking these projects makes it both challenging, and essential, that we establish a rigorous, highly credible accounting system that integrates the whole cycle of forest management, from inputs to fossil fuel consumption to decay.

We also need to take a long-term perspective. Because there is a long lag time between forest management or disturbance and response, carbon impacts may appear decades after management activities. Carbon management in forests also creates contradictory actions. You may want to harvest trees in order to facilitate establishment of a more adaptive stand 20 years down the line, but the built-in lag time between disturbance and sequestration means you will have 20 years worth of emissions to deal with until the forest's sequestration catches up. As a result, our accounting has to be over a long time period rather than year-to-year. It makes sense that we follow the 100-year standard that has become the benchmark for project-based accounting under Kyoto.

From a national accounting perspective, we need to regulate and manage our nationally owned lands as stable, adaptive forest carbon banks. These public lands are critical to our ability to reduce the net emissions of the United States by 10 percent, despite sequestration loss on privately managed lands.

Public versus private lands

The current proposed legislation takes a bifurcated approach to governing public and private lands. These bills recognize that public lands are subject to the traditional “command and control” of public ownership, that we can set goals administratively and provide appropriations in a way that we cannot do very effectively on private lands. Private lands, in contrast, are federally governed only indirectly, through mechanisms such as the Clean Air Act, the Endangered Species Act, and the Clean Water Act. Integrating private forests into the national legislation and thereby enabling private forests to be part of a market system that would not include public forests is becoming an increasingly high-profile topic of policy debate at the federal level.

Public lands

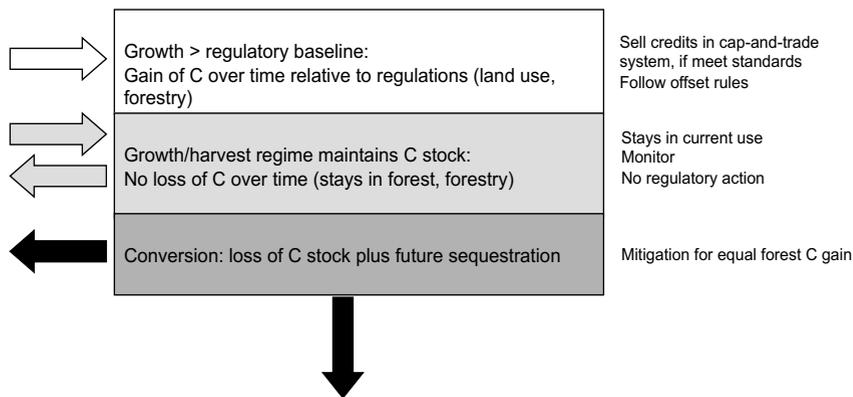
From a national accounting perspective, we need to regulate and manage our nationally owned lands as stable, adaptive forest carbon banks. These public lands are critical to our ability to reduce the net emissions of the United States by 10 percent, despite sequestration loss on privately managed lands. There are a number of management challenges to maintaining public lands as resilient carbon banks. The public funding required to achieve these gains is not insignificant, and fairly large numbers are being discussed for the stimulus package and in ongoing legislation drafting. That funding should be free from any market influence.

Private lands

We have a whole different set of opportunities on private lands to incentivize net gains and prevent or mitigate net losses. There are a number of existing mechanisms to achieve those goals that combine public funds to secure the land base with private funds to catalyze stewardship. As seen in Figure 6, we can break down private

forestlands into three categories for policy analysis: 1) forests that are increasing carbon sequestration relative to a regulatory baseline; 2) lands managed according to “business as usual” practices; and 3) lands that are losing forest cover. The vast majority of attention has been paid to the first category, lands that are increasing sequestration beyond regulatory baselines. Business-as-usual forest landowners, particularly the smaller ones, tend to dislike additional government interference in land management decisions. And lands that are losing forest cover lose both the current and future carbon stocks associated with the forest as it is converted to other uses.

Figure 6 Carbon on private forestlands – regulatory framework



A “no net loss” policy structure would require monitoring of all types of privately held forestland. Private forestland can stay in its current management regime, but government inspectors would need to be given access to monitor sequestration trends. Business-as-usual management may involve harvesting, which would change overall carbon levels, but trees can re-grow. Therefore, lands applying principles of sustainable forest management will maintain carbon stock over time. Landowners that want to play in the carbon market and profit from managing their forests for climate benefits, on the other hand, would have to follow offset rules. The resulting gains would be quantified relative to the regulatory baseline of feasible management in whatever state those lands exist, as well as regulatory, physical, and economic feasibility.

If owners want to pull their lands out of forest, however, they should have to account for sequestration losses. This is set by precedent in many other areas of conservation as well as climate change policy. We have fees and systems for dealing with development of green space across the country. Whether through on-site mitigation, fees, or trading systems, this would be dealt with just like greenhouse gas emission increases in other sectors.

This system would be governed using the precedent set by the Clean Air Act and the Clean Water Act, both of which address issues that were regulated at the state and local levels before federal standards were put in place. In effect, the federal government would assert authority over CO₂, which has been ruled a pollutant by the

Supreme Court and in an upcoming endangerment ruling from the U.S. Environmental Protection Agency (EPA). The government would create a federal standard for monitoring and assessing CO₂ in a standardized way that the states could implement relative to their own regulatory contexts. Of course, this would be a new burden for the states. How can this be addressed in a way that builds upon existing systems, authorities, and funding?

Resources and funding for implementation

As demonstrated in Figures 7 and 8, the basis for a no net loss approach is already established within existing programs. New regulations would primarily build on the existing authority of the Clean Air Act and employ the tools and assistance available through the Farm Bill, the Energy Bill, and a number of other legislative tools. Funding sources would include appropriations from the Departments of Transportation, Energy, and the Interior.

Figure 7 Pacific Forest Trust federal “No-Net Loss” forest approach

Policy Outcome	Administrative Authority	Policy Mechanism	Implementing Entity	Enabling Statute
Standardized Accounting of Forest Carbon Stocks and Sequestration	NEPA	Environmental Impact Statements Requires the preparation of an impact statement for major federal actions significantly affecting environmental quality. Can be used to monitor the loss of climate benefits from forest conversion and to trigger mitigation.	Applicable Agencies	42 U.S.C. §§4321-4370(a)
	Clean Air Act	Non-Attainment Clause Authorizes EPA to withhold Title 23 transportation funding from non-attaining states. Can be used to compel states to assess and monitor forest CO ₂ emissions or face reduced federal funding.	EPA/DOT	§ 179 CAA
	Farm Bill	Statewide Forest Assessments Provides funding and technical assistance for the development and implementation of statewide forest resource assessments and plans. Can be used to implement standardized assessments of forest climate benefits at national scale.	USDA and Applicable State Agencies	H.R. 2419 §8002
	Clean Air Act	Non-Attainment Clause Authorizes EPA to withhold Title 23 transportation funding from non-attaining states. Can be used to compel states to assess and monitor forest CO ₂ emissions or face reduced federal funding.	EPA/DOT	§ 179 CAA
Retention of Forestland Base	Clean Water Act	§ 404 Permitting Maintains “no net loss” wetland policy. Requires developers to avoid wetland conversion, or obtain a permit and mitigate for lost wetlands if conversion is unavoidable. Structure can be used as a model to achieve “no net loss” of forest climate benefits.	EPA/USACE	§ 404(b) CWA
	Food Security Act	Swampbuster Qualifies landowners for government farm benefits contingent upon compliance with wetland conversion guidelines. Can be extended to increase forestland conversion.	NRCS	16 U.S.C. §§3801-3862
	Food Security Act	Debt Forgiveness for Conservation Authorizes farm program participants with loans secured by the FHA to qualify for cancellation of indebtedness in exchange for conservation easements on farms and uplands. Can be increased for forestland conservation.	FHA	7 U.S.C. §2001

Figure 8 Existing programs to help on private lands – regulatory framework

Policy Outcome	Alternative Authority	Policy Mechanism
Retention of Forestland Base	Endangered Species Act	Conservation Grants Authorizes federal agencies to provide grants for projects that have direct conservation or recovery benefits for threatened and endangered species, finance adaptive forestland conservation.
	Farm Bill	Rural Energy for America Program (REAP) Promotes renewable energy for agricultural producers and rural small businesses through grants and loan guarantees for renewable energy systems. Incentivize forest conservation for the production of sustainable biomass energy feedstocks.
	Stimulus Bill	Tax Incentives Extends investment Tax Credit (ITC) to include biomass energy generation and renews Production Tax Credit (PTC) for renewable energy sources, including biomass. Incentivize forest conservation for the production of sustainable biomass energy feedstocks.
	Stimulus Bill	Bond and Loan Programs Provides \$1.6 billion in Clean Renewable Energy Bonds (CREB's) to finance renewable energy facilities, including biomass. Incentivize forest conservation for the production of sustainable biomass energy feedstocks.
	Farm Bill	Environmental Quality Incentives Program Requires forestlands to have approved forest management plan. Can be used to conserve and restore forest climate benefits.
	Farm Bill	Forest Legacy Program Protects forestlands with permanent conservation easements on forests threatened by conversion. Prevent loss of forest climate benefits

Since these pieces of legislation already require and provide funding for assessments and management plans, resources exist to add a standardized accounting methodology to, for example, the forest resource assessment plans written under the last Farm Bill. Such accounting would address the fact that forests were not included in the EPA's recent proposed rule on CO₂ accounting because the EPA felt that the existing data was not sufficiently standardized.

We can also use a “carrot and stick” approach to push states to collect the required information. For example, Title 23 of the Clean Air Act requires states to come into compliance on certain air quality standards; if they fail to do so, they lose access to key transportation funding. There has never been a state that wanted to pass up the opportunity for transportation money. As a result, they all find a way to get this information. In addition, every state has systems that track forest change and carbon, largely because every state likes to collect taxes on harvested wood. States also like to get fees when any parcel of land is developed. We can therefore use both direct and indirect methods for putting in place and refining a system for tracking forest change over time at the state level.

There is also a range of proposed federal legislation to help states pay for required greenhouse gas emission mitigation programs, adding up to several billion dollars in possible funding. Precedence for these programs was set in the Clean Air Act and the Clean Water Act, where the polluter pays. Another very interesting precedent is set by debt forgiveness for conservation, which allows landowners that have used federal funds for a portion of financing and committed to conserving their land base to have their debts partially forgiven. Considering the number of landowners in this country whose

land has fallen in value and who may not be able to pay back their federal debts, this could potentially be a very impressive program for application to climate change policy.

CALIFORNIA: A MODEL

California currently has the strongest state model for an economy-wide approach to CO₂ emissions and cap and trade.

AB32

California implemented a standardized greenhouse gas accounting system for forests under Assembly Bill 32, also known as AB32 or the Global Warming Solutions Act. This legislation monitors forests as a sector, holding the sector as a whole to a target performance level. The legislation embraces the broad concept of a REDD system and includes text aimed at reducing forest loss, reforesting former forests, and working to restore more natural levels of carbon stocks. It was designed from the beginning to be replicable in other regions and to flow into the Kyoto system. As a result, California has signed emission reduction collaboration agreements with the United Kingdom and several other countries. AB32 is why, to my knowledge, the first international funds invested in emissions reductions in the United States were in forests in California.

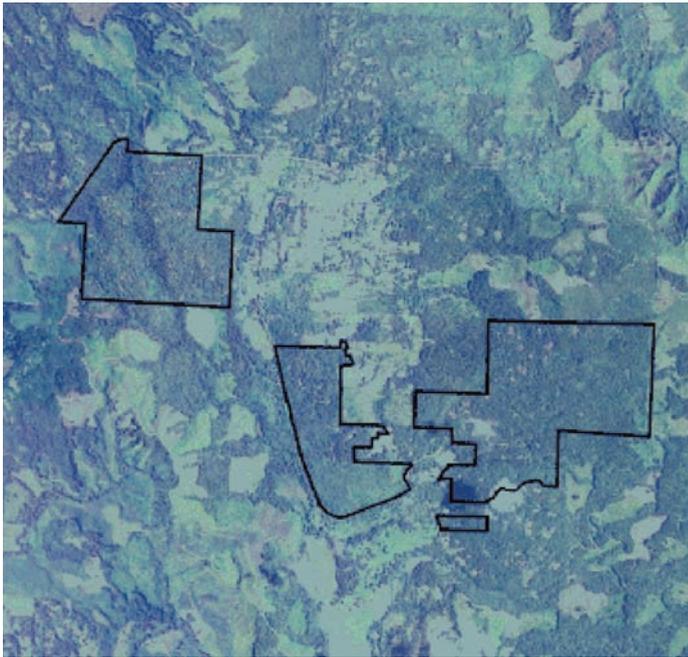
Under California's legislation, the rules that individual entities follow to help meet compliance targets are the same ones that govern all offset projects developed under Kyoto, so that there is a baseline to ensure additionality. There is also a minimum 100-year permanence requirement for forest carbon offsets. Conservation easements are currently the only tool available to govern this requirement, but there may be other tools that evolve over time. The regulation also requires third-party-verified, entity-wide reporting within the forest sector. The environmental co-benefits of carbon sequestration projects derive from the fact that we are managing for native California forest types and include the spread native species, enhanced ecosystem sustainability, and increased resilience to climate change.

The Van Eck Forest Project: A model for forest emission reductions

Figure 9 presents information on the Van Eck Forest Project, which is managed by The Pacific Forest Trust and demonstrates how forest emissions can be reduced and sequestration enhanced within the California climate change legislation. The project is on 2,200 acres of redwood land in Humboldt County – about a quarter the size of the Yale Forest. It is situated in an area that is undergoing urban and industrial development. The forestland is managed to prevent the business-as-usual practice of logging all available standing timber, instead removing less timber volume than is grown each year. As a result, the forest produces carbon emission reductions that can be sold. Demand for these credits is high: all offsets produced to date have been sold. There are now five other forest owners that have registered similar offset projects, including two of the largest Timber Investment Management Organizations (TIMOs) in the country.

The Van Eck property is being managed to restore a more natural native redwood forest than the one that exists today. The native redwood forest would have been habitat for spotted owls, and we now have a pair of spotted owls using the space as a roosting and foraging habitat as a result of our restoration efforts. We hope that they will begin to use it as nesting habitat as well. We recently signed a safe harbor agreement on the property as well. There are enormous synergies between restoring forests for carbon and restoring them for the suite of other values that we want from forests, of which endangered species is emblematic.

Figure 9 The Van Eck Forest Project in Humboldt County, CA



The type of active management used in the Van Eck Forest Project has economic benefits as well. When harvested, this forest yields about three times the volume of timber per acre as a conventionally managed property. We remove about 1 million board feet a year, and take off about 15,000 board feet per acre. The volume of timber taken off of this property is actually increasing over time.

One of the critical elements that has helped this and other landowners change their management strategies is the money that they get from the climate emissions reductions. The Van Eck Forest Project yields additional revenue of about \$2,000 per acre net present value as a result of carbon credit sales of 500,000 tons of CO₂ over the 100-year life of the project. Managing for climate thus creates a triple win.

Increasing demand for forest carbon

Many representatives in Congress are looking to AB32 as a model because it is the most road-tested, economically broad, and robust state or regional climate change

legislation currently in place. It also serves as a model because the role of forests is so well defined, and because those rules have been accepted for pre-compliance purposes at the project level. The credits' known suitability for pre-compliance buyers increases their market value. California forest carbon credits sell wholesale at about ten times the price of allowances and offsets on the Chicago Climate Exchange. Prices are even higher on the retail market.

Landowners are becoming very interested in the revenue that climate change regulation and conservation can provide since demand for timber is down. That interest is breaking down cultural barriers that have existed around the synergy of sustainable management, conservation, and climate values. This increased interest, however, has created a bit of a bottleneck at the Climate Action Reserve, which is the project registry. It is a good problem to have, but the delays in processing are an issue that will need to be addressed going forward.

AB32 demonstrates broadly that integrating the forest sector into a broader cap-and-trade policy and using a no net loss approach to forest management, as we have done in California, can actually lead to a market-based net reduction in carbon emissions. We see significant market demand for the quality of emission reductions that come out of these types of forest projects. If we extend the California model to the rest of the country and look over the next 50 years, we see a minimum gain of 1 to 1.5 billion tons of CO₂ emissions reductions annually. That is a very significant figure when compared to the net greenhouse gas emissions of the United States, which is about 6 billion tons annually.

CONCLUSION

If we do this right – if we incorporate the forest sector as well as offset projects and exercise the existing authority in the executive branch, which is where I think policy is moving – then we have a very promising way to harness the natural assets of the country to meet our international as well as national climate goals. In the process, however, we have to be sure to use a minimum 100-year time frame for project permanence and integrate the forest sector into overall cap accounting. Otherwise, we could address one component of the standard and think we are creating net emissions reductions while, in fact, we could be creating significant forest-sector emissions in the near term. If we are not careful, we could end up with accounting standards in the climate sector that follow the bad example recently provided by the financial sector.

This accounting does not need to be difficult. There are existing systems across the country that we can use as good examples. For example, the recordkeeping we do for waste disposal already has a great deal of accounting on solid wood in the waste stream. We can capture that information to quantify what is going into landfills to become methane. We have taxation on forest products. We have taxation on development. We have very good records on anybody who manages at a large scale in the forest industry. We thus have existing systems that can be grafted into an accounting structure that is already reasonably practical and gets better over time. At the same time, we need to recognize that there is a spectrum of approaches in forest

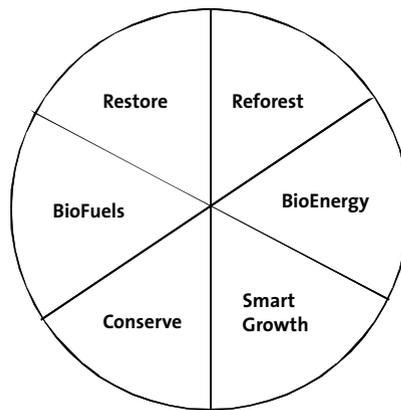
Landowners are becoming very interested in the revenue that climate change regulation and conservation can provide since demand for timber is down. That interest is breaking down cultural barriers that have existed around the synergy of sustainable management, conservation, and climate values.

management that ranges from the very agricultural, the pulp and the biomass plantations, all the way to full conservation. All of those are management choices that can be included in a trading system.

Lastly, I want to make the distinction that the accounting required for forest carbon is very different from simply doing good things for the climate. Under the Farm Bill, for example, the government might provide subsidies and cost share programs that incent landowners to plant trees. That is good for the climate. It is good for habitat. However, it is very different to say that it is going to count in a cap-and-trade system. For such activities to count in the regulated cap-and-trade system, you need the kind of accounting and durability that is going to satisfy buyers that activities leading to forest emission reductions have the same integrity as never pumping that gallon of oil out of the ground.

We need to keep these caveats in mind as we look at the evolving role of forests in climate policy. If we do those things, then I think we will find that the forest wedge (see Figure 10) will be a very significant portion of an effective national policy approach, and of approaches taken on the global scale as well.

Figure 11 Building the forest wedge and closing the loop



If we do this right – if we incorporate the forest sector as well as offset projects and exercise the existing authority in the executive branch, which is where I think policy is moving – then we have a very promising way to harness the natural assets of the country to meet our international as well as national climate goals.

Question & Answer Session

QUESTION 1: Short-term losses versus long-term gains

If we are using 100 years as our point of reference, how much should short-term losses matter if we see gains in carbon sequestration in the long term?

I would make a big distinction here between managing for climate and concerns over short-term losses. The silvics of the Intermountain West are a classic example. If there is an area of heavy encroachment in the Rocky Mountains, then removing a lot of small diameter trees is the right thing to do. This would cause an increase in emissions for a couple of decades but, over time, carbon accu-

mulation would be greater in the remaining large trees than it would have been otherwise, resulting in a net gain in carbon sequestration. The accounting would have to honestly reflect that initial period of emissions followed by a period of net sequestration.

On public lands that are not subject to market influences but can be managed for the public good, treatments such as removing those small diameter trees should absolutely be done to increase the resilience and adaptiveness of these forests. A private landowner who wants to be in the carbon market, however, should have to report management activities and the resulting climate impacts on an annual basis, and those reports would need to be verified. A forest that is being cleared or thinned would yield nothing to sell in the near term. To this end, The Pacific Forest Trust advocates strongly for not giving project-level emission reduction credits to fire fuel load reductions, because that action actually reduces sequestration in the near term and there is no guarantee that it will actually prevent an intense wildfire in the future. Yes, it is the right thing to do from a silvicultural perspective. Government should subsidize it or share costs. We should provide for liability. But, from a market perspective, no emission reductions result from that thinning, unless you have a market for bioenergy. In that case, the bioenergy market should pay for the treatment and for the materials, and landowners will get a new product out of the forest even if not an emissions reduction credit for the fuel treatment.

QUESTION 2: Baseline additionality

In the scenario you just described, where do you do this treatment in order to create net gains in the future? How would you evaluate stands that were thinned prior to legislation being put in place?

The question of when the baseline should be established is a political one that varies according to state or federal legislation. In a voluntary market, the baseline is set by each system according to its own rules. When establishing a project, you should tie the baseline to whatever policy you are trying to help fulfill. For example, California's baseline is tied to legislation passed in 2000 and 2001.

QUESTION 3: Tracking carbon sequestration in wood products

Whether or not you can count the carbon in wood products as truly sequestered seems to have a large impact on whether projects are eligible for sequestration credits. That also seems to be the hardest pool to guarantee because the product is difficult to track once it leaves the forest. Have you found that there are good ways to quantify sequestration in wood products?

This is the subject of continuing intense debate. The best long-term data sets are probably those of Mark Harmon out of Oregon State. As the science currently stands for U.S. forests nationally, there is very little difference, over a 100-year time period, between the decay rate of wood left in the forest versus wood that has been harvested and put into use in other economic activities. The decay rate is about 5 percent a year at the low end

and about 15 percent a year at the high end. Harvesting takes roughly a third of the forest carbon out of the forest and moves it into the product chain. Over 100 years, the decay rate is fundamentally the same as if it had been left to decay in the forest.

Substituting wood for fossil fuel use can have a significant positive impact on net greenhouse gas emissions. You can create emission reductions if you can show that the production of woody biomass is a closed loop, so that you are re-sequestering the amount that is transferred out of the system, and that wood is being substituted for fossil fuel as an energy source. This has some similarities to urban forestry. Neither management regime would produce significant sequestration in the forest, but both would reduce the energy required for maintaining the larger system as a whole.

QUESTION 4: Transferability of wood product sequestration methodology

Following up on the previous question, what are your thoughts on how this methodology transfers across geographic regions?

I think the basic framework of including forests as an emissions sector is completely portable. I feel the same way about an accounting system that allows regulators to track the flow of carbon and about mitigation requirements for land taken out of forests. These methodologies form the basis for a policy goal of no net loss across the sector.

The framework is also portable to the project arena, although the methods may be different. Every state has some floor for land use or forest practices, or both, and those levels can form the baseline for what is feasible from legal, financial, and physical perspectives. Management that produces carbon sequestration above and beyond that baseline would qualify as additional if it meets at least the 100-year permanence standard. The same is true for the question of the statistical requirements and confidence levels for accounting in terms of accuracy. Now, could we lighten up on the intensity of sampling that is required under the California system? In my view, yes, particularly with more homogenous forest types. The forest types in California are very heterogeneous, and the terrain is challenging, so we might need a different sampling regime.

By and large, therefore, I think the overarching system is very portable. The management baselines and other details would be specific to each state.

QUESTION 5: The underlying economics

The phrase “conservation markets” connotes that at least some landowners are going to be compelled to participate based on the pure underlying financial economics of the decision to put forests into more climate-friendly management rather than continue with business as usual or follow the baseline set by the California Forest Practices Act. Most of the landowners who have signed up in the early phases, however, are ones who have already committed to some conservation management over and above that baseline. I recently spoke with some pretty progressive ranchers who sharpened their opposition to participating in the carbon market in the last couple of years because of the high up-front

Substituting wood for fossil fuel use can have a significant positive impact on net greenhouse gas emissions. You can create emission reductions if you can show that the production of woody biomass is a closed loop, so that you are re-sequestering the amount that is transferred out of the system, and that wood is being substituted for fossil fuel as an energy source.

cost relative to the diminished future cash flows that they would be likely to receive under even a compliance market.

What can we do to induce these landowners to join in and bring this idea to scale? For example, what would the price of carbon have to be to make this more mainstream, and/or how can we reduce the up-front and opportunity costs? Somebody told me once that a ton of redwood carbon at the sawmill is worth about \$40 per ton, while forest carbon is around \$10 a ton. How do we prove the system for landowners who are going to make this decision based solely on the economics?

I think we need to do for forests precisely what we are doing in the energy sector, in the transportation sector, and in the agricultural sector, which is to provide as many subsidies as possible to reduce the up-front costs of making the market work. The list of programs in Figures 7 and 8 is the source of that money. Subsidies would create immediate incentives for landowners and allow the market to pay for the benefits we will see later.

I think streamlining the inventory and verification processes will be essential to reducing the costs of participation. Right now, it is a new system and the verifiers check the same data sets over and over again. By enabling the data to be fed directly into a regulatory system, we could reduce the work of the verifiers and make the system more efficient. Fundamentally, however, if we want to treat forests with parity, we need to put the same billions of dollars into smart landscape management as we are putting into subsidies to make renewable energy available and to create smart transportation and smart development.

I think we need to do for forests precisely what we are doing in the energy sector, in the transportation sector, and in the agricultural sector, which is to provide as many subsidies as possible to reduce the up-front costs of making the market work.

QUESTION 6: Carbon prices

Prices in the Regional Greenhouse Gas Initiative (RGGI) market are currently about \$3.50 a ton, which is far below what anyone says is needed to make forest projects viable. What would it do to your value proposition if prices end up being that low in a federal compliance market?

It depends on the broader context of the forest sector. If landowners cannot sell forest products, then \$3 a ton for carbon looks good, particularly if selling that carbon does not preclude future economic options for a working forest. And if up-front costs are being paid out of the other buckets of money we were just discussing, then \$3 a ton might be attractive. However, I do not think that the RGGI market is the model that is being looked at for the price points in a federal system; instead, they are looking at the European market. Prices in the European market better track what prices would look like in an economy-wide cap-and-trade program. The pricing that has been done for a compliance system under AB32 used \$20 a ton as the back-of-the-envelope number. That \$20 was a lot closer to the European number at that time, and policymakers assumed we would have economies of scale and experience from outside of California that would keep the average cost of compliance down. As far as I am aware, the Obama administration is not looking at anything in the single digit arena either.

QUESTION 7: Forest advocates

Who else is speaking in support of the forests? Who is speaking against the forests? If you could bring any one group in to add their voices on behalf of the forest, what would that be?

There are many more groups currently speaking around, about, and for forests than there were a year or even six months ago. It used to be that any time I would go up to Capitol Hill, people would say, “How come I don’t see more of you?” But now there is quite a roster of people who are speaking. You have environmental organizations, wildlife organizations, brokers, buyers, forest landowners, agricultural land interests, and energy interests all speaking on behalf of some kind of a role for forests.

I think we will have even more stakeholders coming into the discussion over time. Within that, I want to see more voices of stakeholders who see forests for their climate benefits broadly as opposed to those who see forests for their carbon units that could be traded. Fundamentally, the benefits of carbon are not the same as for a board foot of timber. They are broader.

QUESTION 8: Role of the agricultural community

Could you talk a bit about the agricultural community and how you see their voices playing out in this arena?

If you think of the landscape as a continuum from wild forests all the way to complete row cultivation, there is a big segment of forestry, particularly in the Southeast and in the Midwest, that is on the plantation and agricultural end of the spectrum. Moreover, 50 percent of all private forests in this country are owned in conjunction with farms and ranches. There is thus an inseparable interaction between forests and agriculture. The challenge we see with the practice of agriculture is the large volume and frequency of disturbance it creates. Accounting for the carbon released or sequestered by certain tillage practices, for example, is therefore much more difficult. This is particularly problematic in international discussions. As a result, while the United States may devise a system that focuses on the subsidy side of changes in agriculture, I think it is going to take much longer for that to evolve as part of any kind of a global system.

The non-biological emissions associated with agriculture are being addressed through caps on fossil fuels. That currently accounts for about 14 percent of U.S. emissions. I think that the question of whether increases in agricultural sequestration will generate tradable units of carbon is a more debatable proposition. Crop switching for bioenergy crops and for fuel crops is potentially a more straightforward issue. But, as we saw with corn ethanol, good accounting will be critical.

50 percent of all private forests in this country are owned in conjunction with farms and ranches. There is thus an inseparable interaction between forests and agriculture. The challenge we see with the practice of agriculture is the large volume and frequency of disturbance it creates. Accounting for the carbon released or sequestered by certain tillage practices, for example, is therefore much more difficult.

Copenhagen and Beyond: Expert Perspectives on the International Climate Negotiations

Bradford S. Gentry (*Moderator*)

Director, Center for Business and the Environment at Yale

James Cameron

Executive Director and Vice Chairman, Climate Change Capital

An expert in developing policy responses to climate change, James Cameron is responsible for strategic and sector development at Climate Change Capital. He previously was Counsel to Baker & McKenzie and founder and head of their Climate Change Practice. Mr. Cameron negotiated the U.N. Framework Convention on Climate Change and Kyoto Protocol as an adviser to the Alliance of Small Island States. He has held academic positions at Cambridge, London, Bruges, and Sydney. He is the Chairman of the Carbon Disclosure Project, Treasurer of the Renewable Energy and Energy Efficiency Partnership, and Senior Advisor to The Climate Group. He is a board member of GE Ecomagination, a member of the Copenhagen Climate Council, and a member of the World Economic Forum Climate Council.

Nancy Kontou

Head of Cabinet to the EU Environment Commissioner Stavros Dimas

Nancy Kontou has been involved in policy development, adoption of legislative proposals and international negotiations on climate change, biodiversity and other environmental issues. Ms. Kontou has worked for the European Commission since 1990. During her career, she has vetted mergers and other private agreements in the light of E.U. antitrust law. She was a political advisor to Sir Leon Brittan on matters of trade policy, and she was involved in the negotiations with countries of Central and Eastern Europe leading to their becoming members of the European Union in 2004. Ms. Kontou holds a LL.M. from Harvard Law School and a Ph.D. in International Law from Cambridge University.

October 22, 2009

5:00 to 6:30 p.m.

Burke Auditorium, Kroon Hall

195 Prospect Street

Chapter 8

Copenhagen and Beyond: Expert Perspectives on the International Climate Negotiations¹

James Cameron

Executive Director and Vice Chairman, Climate Change Capital*

Bradford Gentry

Director, Center for Business and the Environment at Yale**

Nancy Kontou

Head of Cabinet to the EU Environment Commissioner Stavros Dimas***

In this chapter, the authors describe the international climate negotiations process and some upcoming prospects for COP 15. While addressing the challenges of reaching an international agreement that balances national interests with global needs, the authors also emphasize the importance of establishing a consensus framework on climate change for the continued development of carbon markets around the world. The authors deliberate on the looming question of what will happen in Copenhagen, and offer important forward-looking perspectives in anticipation of the outcome.

INTRODUCTION

Nancy Kontou

There is a lot of news coverage these days about climate change, both in Europe and here in the United States, and that is a good thing. There is a lot of coverage about Copenhagen, too, and quite often there are voices that berate the lack of progress and wish that more had been accomplished so far. This is also a good thing, because at this stage in the negotiations, there are reasons for concern – it is even good to panic

¹ The authors of this chapter are members of the Renewable Energy and International Law Network – REIL Network.

² For more information on Climate Change Capital, please go to www.climatechangecapital.com

³ For more information on the Center for Business and the Environment at Yale, please go to www.yale.edu/cbey

⁴ For more information on the EU Environment Commission, please go to www.ec.europa.eu/commission_barroso/dimas/index_en.htm

a little, provided this panic is channeled constructively into a renewed momentum to have an agreement in Copenhagen.

My personal view, and this is probably the main message I would like to give, is that it is still possible to have a meaningful climate change agreement in Copenhagen, provided that the political will remains strong. There are many countries involved in these negotiations and the whole process is quite complex – but we must also keep in mind that it is from the major emitters, either in the developed or in the developing world, that we need to have significant emission reduction commitments in order to achieve the result we all want.

What I want to do today is to look at the state of the negotiations from three angles. The first is what we would ideally like to have out of Copenhagen. The second is the progress we have made so far, and the third is what more needs to be done in order to have a meaningful agreement in Copenhagen.

What do we want out of Copenhagen?

Science tells us it is desirable to limit the average temperature increase to below two degrees Celsius in order to prevent catastrophic consequences from climate change. According to the very large majority of scientists, substantial greenhouse gas reductions are therefore needed. Based on some recent data, even staying within two degrees may not be enough and it would be safer to aim for a maximum 1.5 degree increase. The 2 degree target means that there should be reductions in developed countries' emissions on the order of 25 to 40 percent compared to 1990 levels. For the developing countries, there should be reductions from business-as-usual, meaning that those countries should be allowed to grow, but there should be a cap on their growth on the order of 15 to 30 percent from business-as-usual.

The kind of commitments we are seeking from developed and developing countries would be different. From the developed countries we want commitments to country-wide emissions reduction targets compared to some past baseline – 1990, in the view of the European Union. By contrast, we are not seeking commitments to such targets from the developing countries, but commitments to specific actions that will result in a reduction from business-as-usual emissions levels. This is a basic distinction that everybody accepts. The challenge is the legal form this kind of commitment can take in the context of an international agreement.

A Copenhagen agreement should cover not only emissions from industrial sectors but also other important areas. Forests are a major area that needs to be addressed in this context, as well as emissions from international transport.

In addition to reduction commitments, Copenhagen must deal with financing. Without money there will be no deal. Developing countries expect significant international financial support to help them in their efforts to reduce their emissions, and also to adapt to the inevitable consequences of climate change. That is particularly important for the least developed countries – the poorest and most vulnerable.

The third element we need in Copenhagen is what I would call supplementary measures. What I have in mind in particular is international cooperation in the

development and deployment of green technologies to help us achieve our emissions reduction goals.

A fourth and final important element of the agreement is monitoring and reviewing. Even if we have a perfect agreement in Copenhagen, it will not be the end of the story. In order to limit temperature increases to two degrees or below, we should be looking for emission reductions also in the long term, by 2050. We will need commitments not only for 2020, but also for subsequent years. In order to do this, Copenhagen must provide for a process of reviewing and upgrading commitments, so that we can adapt and improve in the future what countries are willing to do today.

What progress have we made so far?

So, where are we now and what remains to be done? There are a lot of positive developments, especially when we compare the situation with last year. We forget how things have changed. For instance, the attitude of the new U.S. administration towards climate change and an international agreement has changed very substantially from the previous administration. Major emerging economies are also putting in place or envisaging national mitigation strategies.

Where are we in terms of specific reduction targets? The European Union has made a unilateral commitment to reduce emissions by 20 percent compared to 1990, and is willing to do more – 30 percent – in the context of an international agreement, if other developed countries undertake comparable obligations. Japan has also recently announced a very ambitious target – a 25 percent reduction compared to 1990 emissions levels, conditional on having a comprehensive international agreement. Australia has also recently upgraded its target, again on the condition that a comprehensive international agreement materializes.

The key question that remains is what the United States will be willing and able to commit in the context of an international agreement. You know the situation in the United States: Congress is currently discussing climate and energy legislation, but this process is unlikely to be completed by the end of this year. For the time being, the U.S. position in the international negotiations is very vague, precisely because the internal legislative process is not yet fully concluded. However, without a United States commitment to a specific mid-term target for emission reductions before Copenhagen, it will be extremely difficult to convince other countries, and in particular the major emerging economies, to contribute meaningfully to an international agreement.

What have been the positive developments in developing countries? There are a number of national climate strategies – domestic or other measures that have been announced by a number of big emitters including China, India, Brazil, Mexico, and Indonesia. All of this is, of course, very positive, but there are two issues to consider further. The first is to see whether the actions that have been announced could be further improved. The second is to see how these national commitments can be internationalized, i.e. how they can be reflected in an international agreement. It is one thing for China or India to say they have domestic programs, but it is a different

There are a lot of positive developments, especially when we compare the situation with last year. We forget how things have changed.

thing to say, yes, they are willing to put it into an international agreement so that it becomes internationally binding. This is where all of the discussions are taking place at the moment and, of course, these are all questions that have to do with monitoring of commitments and compliance. I am sure a lot of attention will be devoted to these issues in the future too.

Public finance to developing countries

Now I come back to the finance issue. We need figures here as well, pledges for international financial support. The European Union has already started this process. The European Commission has issued proposals about how much money we think is needed globally, and what the contribution of the European Union could be. There will be further discussions with our member states to decide, certainly before Copenhagen, what the precise contribution of the European Union could be in the context of the international negotiations. We are talking here about public finance to be made available to developing countries in addition to what the carbon market is already offering or will offer in the future. The European Union should complete this decision-making process and, of course, other countries should also come up with their financial offers before Copenhagen.

Other discussions seem to be much easier. For instance, the discussion on cooperation on technology development and deployment seems to be going very well. There is likely to be agreement on global mechanisms for further international partnerships on technology development in key areas.

The really crucial areas of the agreement are, however, as I said, mitigation by developed and developing countries, and international financial support. This agreement is, if you like, like a puzzle. It will not be resolved until all the pieces of the puzzle fall together. If there are no important emission reduction commitments from the developed countries, it will be difficult to convince the developing countries to contribute. If the major emitters in the developing world do not want to include their national actions in an international agreement, it will be difficult for developed countries to convince their national constituencies that everyone is making a fair contribution. And then, of course, if there is no finance, developing countries' mitigation actions will be much more limited. What I have seen from the last sessions where I have been present, either at a technical or political level, is that all the major participants now realize that it is important to have an agreement in Copenhagen, and that failure is not an option. So, to come full circle to what I was saying at the beginning, I think a meaningful agreement is still possible in Copenhagen.

HOW AN AGREEMENT ATTRACTS INVESTMENT FLOWS INTO THE GLOBAL CARBON MARKETS

James Cameron

I am pleased to be able to talk to you about what could be with this latest iteration of the global agreement on climate change. I suppose my first point is, because I used to

This agreement is, if you like, like a puzzle. It will not be resolved until all the pieces of the puzzle fall together. If there are no important emission reduction commitments from the developed countries, it will be difficult to convince the developing countries to contribute. If the major emitters in the developing world do not want to include their national actions in an international agreement, it will be difficult for developed countries to convince their national constituencies that everyone is making a fair contribution

be a negotiator on behalf of all the small island states, that I do acknowledge how difficult these negotiations are. We have to temper our ambitions and expectations for the event itself with an understanding of the complexity of the process. I don't think there have been many negotiations ever conducted in the public policy realm that even approach this level of complexity – the range of interests, the economic factors at stake, the powerful vested interests, and the complexities associated with innovating to create a new set of incentives for altering, in fact, taking a whole global economy down a different trajectory.

I think we have to understand how hard this is to do. However, I fear I might need a strong drink with an old friend in Copenhagen if we finish up at the end of two weeks and what we got looks remarkably like what we got in June 1992 in Rio. That might be too depressing, so what I am going to suggest to you is that we do have the resources to put to work, to grapple with the climate change problem, to make the transition to a low-carbon economy over the right timeframe. The timeframe is relatively brief, 10 or 15 years, but it is absolutely imperative that we have policy frameworks and real time incentives that create a new vested interest in that transition – and we do not have that yet. That is why it is so important that Copenhagen be successful, that momentum is maintained, that governments that have taken the lead feel supported and validated for having done so and not isolated for having done so. That is particularly the case in the European Union, but at the same time we have to acknowledge that countries will go at different speeds and they are likely to choose different methods to achieve similar objectives.

It matters very much to the world that the United States gets its domestic legislation in place in a form that is vaguely comparable to what the rest of the world is doing, and in some sense compatible with the investment objectives of the private sector. These investment objectives travel across boundaries. There is not much interest in whether the incentive derives from the United States or China or Europe.

**Delivering a market-based solution to a global environmental problem:
Public policy and carbon markets**

Let me just say something about how continuity is essential for maintaining investment flows in the carbon market, and just a little bit of a reminder of the essential elements of the carbon market. What is so fascinating about this market mechanism is that it is really the first time that public policy objectives have been attached to a market that is global and comprehensive from inception. The markets that have been tried and tested here in the United States did not have to cope with anything like the scale and complexity of the global carbon market that we have invented through the Kyoto Protocol. It is being given real power through the actions of the European Union. And, as you would know already, this is a pretty unique form of marketplace. It only exists to deliver the public good. Sometimes the media gets overexcited about the traders and the wins and losses and who is up and who is down in the marketplace, and they just don't seem to notice that this market mechanism is only there to deliver the public good of taking tons of carbon out of the atmosphere.

What is so fascinating about this market mechanism is that it is really the first time that public policy objectives have been attached to a market that is global and comprehensive from inception...And, as you would know already, this is a pretty unique form of marketplace. It only exists to deliver the public good.

The traders, if you like, are a sort of strange version of modern day civil servants. They are distributing public policy – they do not fancy themselves that way, but they are. They are distributing public policy efficiently. Of course they can lose money, too, but they carry the risk of delivering that policy, not public finance. So when money goes to China through the Clean Development Mechanism to remove a ton of carbon, that act is carried out? by the private sector. All the risks associated with that transaction are carried by the private sector. No public money is involved with that, other than a little tiny bit to administer the system – too little, as it happens. A lot more money should be spent on making the system more efficient, but it is miniscule.

The investments into Climate Change Capital come from Dutch and British pension funds, mostly, and some corporate investors. That is private sector money is going into China to take tons of carbon out of the atmosphere, because of projects in an alignment of interests between a multi-lateral agreement, a regional agreement, and a developing country government. You here in the United States are beneficiaries of that. The U.S. citizen gets the benefit of that transaction, despite the fact that the United States is not a party to the Protocol, because a ton of carbon reduced matters to us all. It also matters that private sector money is being used there because, if it is not public sector money, then public sector money can go into something else. It frees up public finance resources. The public policy target is delivered by private capital.

The other thing about the carbon market is that it is testing what capitalism can do to deliver the public good, having just been through a period where there are, rightfully, questions about what capitalism can do for the public good, about where risk is distributed, and who picks up the burden of failure, when many of the costs of failure have been socialized by the public purse. I think there is something really fascinating in the carbon market as a model for the next generation of capitalism that requires serious study first, but it also justifies some faith that this is a sensible pathway to go down.

Sometimes I feel as if the carbon market is too easily criticized for its failings too early on in its development. Particularly here, if you read the Wall Street Journal too often, you will find that it is very easy to criticize the global carbon market. There are fears of whether the U.N. can run a system that is not in some way fraudulent and whether it is possible to move money into China and not be taken advantage of. Why is this wealth transfer taking place between money here, if you like, and investment in China? It is because more attention needs to be paid to the tremendous opportunities associated with reconfiguring capital flows to deliver the public good of reducing emissions?

Climate Change Capital is the largest private sector source of capital to invest in the carbon market in our business. We have other funds focused on clean technology, green buildings, infrastructure projects, especially renewable energy infrastructure projects, but our largest fund is focused on the carbon market. That said, we finish our investment period at the end of this year and we do not have a follow-on fund in place yet. That is partly because of the credit crunch, but it is also because we do not

I think there is something really fascinating in the carbon market as a model for the next generation of capitalism that requires serious study first, but it also justifies some faith that this is a sensible pathway to go down.

yet know where the money should go to deliver the public good in the market that is still not secured. We know, thanks to the European Union, that there will be a carbon market into which we can sell our investments. But we still don't know whether every single project that is currently approved in the U.N. system will continue to have value in the European Union after 2012.

We obviously do not know what is going to happen in the United States. We think that there is this moment, this very interesting moment perhaps around 2014 or 2015, where you could have the European Union, the United States, China (which is developing its own emissions trading system), Japan, Canada, and Australia all creating demand for emission reductions at roughly the same time. That is a very, very substantial opportunity for investment, but we do not know if that is going to be the case. I think it is, but me thinking it is, is not good enough to persuade conservative and somewhat damaged institutional investors to put money into these markets. So, we really need continuity in the carbon market and we need extensions out of the current marketplace into areas that are profoundly important for investment, like infrastructure.

A successful agreement in Copenhagen will attract private capital

What else would you wish to find in an agreement? My test of whether there is a useful agreement in Copenhagen is – can I take it to an investment committee? Is there something here to make investors change their minds and put money to work reducing greenhouse gas emissions in one form or another, whether it is private equity investments or public equity, environmental funds or in infrastructure investments?

I am not sure we are all that close to getting that kind of an agreement in Copenhagen. It really bothers me that there is a significant risk that we will finish up with something that looks too much like a G8 communiqué – which I can tell you, you can't take to an investment committee. I am interested in how we maintain continuity in the Kyoto Protocol, which is still in its early days. We are only one year into the commitment period – 2008-2012 is the commitment period. We are only one year in and it is far too early to judge whether this thing is working as it should, especially when a carbon price is fixed on the minds of governments and enterprises alike. We have to persevere with it – it is too early to change course. But it is also the case that the United States is not going to ratify the Kyoto Protocol. There is a kind of pathology that I don't understand at all. Which means it is almost impossible to talk constructively about the Kyoto Protocol close to power in Washington, despite the fact that many of the ideas that do seem to be working are American in origin, like emissions trading.

We are not going to have ratification by the United States, so we need something that the United States can join in on, a multi-lateral agreement. The poor negotiators have parallel tracks at the moment, but no one in their right mind would create negotiating circumstances like this and feel that they could be productive, having two sets of negotiations going on simultaneously – one with the United States in and one with the United States out, one with the structure of

targets and timetables and a review of science entering to a continuous process to reset targets, and the other with a set of broader, longer-term objectives but no short-term targets. You have heard what Nancy Kontou has said about the necessity – for her delegation and many others – that the United States come forward with specific short-term reduction targets.

Others may have different views, but I am not hopeful that the United States will come to Copenhagen with those kinds of commitments. So, what I will hope we will do is continue with the carbon market as it is. We will extend it, we will simplify it, we will make it much clearer what counts and what does not count. We will make sure that whatever the United States does domestically can connect to the global carbon market, because, believe me, the United States needs it to soften costs associated with a cap-and-trade system here.

One of the attributes of the carbon market, which is particularly important for the development of finance, is that the Certified Emission Reduction – the currency that is issued from the Clean Development Mechanism – floats free from domestic currency. This is really important. It makes it much more likely with the CER that money flows into emerging markets because I would not have to collect my rent, if you like, from a consumer in China, Indonesia, Pakistan, or Central Asia. I get my reward from a public policy-driven market, probably in Euros with a Spanish utility or German utility that buys the credit. Now that makes it a much, much more attractive investment than you otherwise would get investing in a developing country or an emerging market.

Finally, I hope we get the sort of things that Nancy has put out there. If I could see at the end of December the things that Nancy described as the ideal outcome, I could take that to an investment committee. What is more, I would go out there and raise a big fund for our business and I would employ more people. That is what I would do. That is what would happen. And it would be emblematic of many, many other businesses that do not carry that dedicated name of Climate Change Capital, but are just sources of capital or business enterprises that know that now is the time to deploy in scale into the low-carbon economy. It really makes a difference. And I hope we can figure out how to plot that pathway. We haven't got very long. Only a few days left.

A ROLE FOR PUBLIC FINANCE?

Bradford Gentry

Let me make a couple of points following up on Nancy's and James' remarks, both on the public finance side to complement the private finance side, and then a little bit on the U.S. position going into Copenhagen. For those of you I work with, you know it is odd for me to be thinking about public finance because I mostly think about private finance. But it is utterly clear that there needs to be substantial amounts of public finance coming in here for a whole bunch of different reasons, not the least of which is the ethical responsibility of developed countries – we created the problem

and the people who are going to face most of the problem should not have to pay for all of it. So, there is an angle there that is uncomfortable to talk about in the United States, but I think it is a huge theme running through the discussions that we, here in the States, are going to have to get our arms around.

Where does the public money come from? China? The United States? A lot of countries are already putting their national public money into these areas through incentives for renewable energy. The public money question that is on the table for Copenhagen is what new forms of international public money might come together. The one that gets a lot of the attention is foreign aid or official development assistance type money that is in addition to traditional foreign aid. It is done in a similar way to domestic taxpayers' monies going to a national government and then going into some sort of foreign pot of money.

That leads to two broad topics. One of them is – what are some of the other mechanisms for generating new international public finance and should any of those be explored in the treaty? Secondly, to the extent that you collect a big pot of money at the global level, how do you govern it? How do you decide how it is distributed? Just on the foreign aid-like side, people talk about “assessed contributions.” That seems to be the terminology that people are using, but there are some interesting new experiments. I was talking to a famous energy and climate economist the other day about whether there are any taxes at the global level. He said, no, that would never happen, but there actually is one now in the Clean Development Mechanism. The international regime has a claim on a share of the proceeds of carbon credits registered under the Clean Development Mechanism. So, in many ways, we have our first truly global tax.

And there are two other ideas about public financing that are talked about in the negotiations now that do not appear to have gotten a lot of attention; I wonder whether they are artifacts of the treaty or whether they will be given serious consideration. One is to generate additional public finance by auctioning international allowances. This is being debated in the United States surrounding Waxman-Markey: you can give allowances away for free, you can grandfather them, or you can auction them. Should there be an international auctioning of the allowances that countries that have made emission reduction commitments are assigned? Or should they all be given away for free? Certainly there is some discussion of auctioning assigned amount units at the international level, and some people would like to see that happen. Another potential source of international public funds that Nancy mentioned is based on international transportation activities. Some have suggested that there be international levies, taxes or other charges on aviation and maritime fuel. Are those going to be a part of the international negotiations?

So, as we think about the potential areas that are being talked about now around generating international pots of money, we see there are assessed contributions – the existing share of proceeds on the carbon markets – which may increase, a potential auctioning of international allowances, and a potential levy on maritime and aviation fuel. Those are parts of the draft treaty that are being talked about at the moment, and

whether they survive or not we will see. I will talk a little bit about my sense on that in a second.

The other topic, on governance and distribution, has to do with the current financial crisis and a tectonic shift in financial capacity across the international community. Just look at the coffers of the United States versus the coffers of China and you can say, wow, things have really changed from a decade ago or 30 years ago. This is leading, not surprisingly, to China and India and other countries in the developing world saying that they want more say over how international public money is allocated. They want more of a seat at the table. And there is a debate at the moment in the negotiations about, once we succeed in generating a pot of money, who is going to have a say in how it is distributed?

There seem to be a couple of different models being discussed. One model is that the World Bank, the Global Environment Facility, and other existing organizations are doing just fine – we just need to make them more effective. So let's build from existing institutions. That is attractive to folks who have a big say in those existing institutions. At the other extreme are the parties that say that those existing institutions only benefit the traditionally wealthy countries, which are not so wealthy anymore, and that we should have an entirely new mechanism. We should set up a mechanism that is directly governed by the Council of the Parties (caps?) to the climate treaty, and we should set up a new global financial architecture around responding to climate change. And then there are those who say that we should figure out how to make better use of the existing multi-lateral funding organizations with guidance from the council of the parties in various ways.

My sense is that clearly assessed contributions and a share of the proceeds from the carbon markets will succeed as sources of international funds. It is much less clear to me that enough governments would support the auctioning of assigned amount units, or the imposition of new taxes on global transportation fuels, but I think it will be interesting to see what happens there. My guess is also that the costs of setting up an utterly new governance structure for international pots of money are so high and the time it would take is so long, that some combination of greater influence from the council of the parties and improvements or changes in the way existing institutions function seems more likely.

U.S. POSITION GOING INTO COPENHAGEN

Briefly, regarding the United States, we are not going to have climate legislation here before Copenhagen. We will be lucky to have a Senate bill in the first quarter of next year. We will be extremely lucky to have Congress pass a bill in the first half of next year, and there is lots of debate about whether that is possible. So, what does the Obama administration do going into Copenhagen, not wanting to be the party at the table that is blamed for the collapse of the talks? Does the president get out in front of Congress and say, I am going to commit the United States to a particular target, either on emission reductions or on finance, and I am going to sell it to Congress? That seems pretty unlikely. My impression is that the administration is not going to

go there. So, it is left with some more artful activity around claiming emission reductions from things that are already happening, or things over which the administration has control, not only renewable energy incentives and things like that, but also possibly the new rules that the Environmental Protection Agency has floated out there for reducing emissions from power plants. Maybe there is an opportunity for the United States to go in and tell a good enough story that people won't laugh them out of the room.

James Cameron

Just a couple of points on the U.S. situation. I would have thought that you could go back into the domestic negotiations now with the prospect of the Environmental Protection Agency regulating facility by facility, in a pretty old-fashioned way, often not knowing any better than the facility manager what the best technology is to reduce greenhouse gas emissions from the plant. This would be very laborious, time consuming, and expensive – absolutely not what industry wants. There is also litigation underway that would not be an appealing alternative to industry. The 2nd U.S. Court of Appeals recently issued a decision that enabled probably half a dozen states plus New York City and the Audubon Society to have access to the courts to sue the five largest emitters of greenhouse gas emissions in the utility sector. There are three points to that litigation: one, they got standing to bring the case; two, it was ruled to be not a political issue, but a legal issue; and three, they could bring the claim as a public nuisance. I do not know how many lawyers there are in the room, but that is quite an opened textured principle that is quite commonsensical to apply and does not require very much evidence of causation between act and damage. You just construct harm on your own property. That is not very attractive to the five largest emitters of greenhouse gas emissions in the utility sector.

So, you have litigation, which sometimes brings a binary result, you litigate for years and years, and then you go bust. Or you have the Environmental Protection Agency regulate facility by facility. That is not very attractive either. You would have thought that many of the industries that are complaining most about cap-and-trade regulation might find it marginally more interesting now as an approach, given those two alternatives. And, in particular, I wouldn't mind asking their shareholders to choose which of the three options is most attractive.

Bradford Gentry

You are seeing that happen – some off the electric utilities have dropped out of their traditional trade associations over differences on climate policy.

James Cameron

I saw that, and that will make a difference, because as soon as the United States gets domestic legislation in place that is in some way comparable to the other nations of the world who have either gone first or are waiting behind the United States, then

they all fall in. You watch what happens to Australia, Canada, and Japan; they all fall in. And then the same sort of early experimentation we saw in the carbon market will happen with clean technology. The same will happen with infrastructure. Suddenly half a dozen reasons not to act disappear and capital flows, innovation increases, careers get made on the back of the transformation, and people start to drop the reasons not to act.

Question & Answer Session

QUESTION 1: The enforceability of meeting commitments under an international agreement

Say for example that developing countries get on board with a global agreement and establish a domestic target for greenhouse gas emission reductions over a set period of time against a particular baseline year. How do you enforce such an international agreement so that countries are responsible for actually achieving those targets?

Nancy Kontou

Each international agreement has its own monitoring and compliance requirements. It depends on the parties to negotiate and to agree on those kinds of obligations.

The pre-Copenhagen discussions are currently focusing on monitoring, reporting, and reviewing commitments, in particular the commitments for mitigation actions from developing countries. Will these commitments be monitored by some independent body? Will they be assessed before they are incorporated into the agreement? Will there be a process for reviewing developments and updating those commitments from time to time?

This is a difficult discussion, because some of the major emitters in the developing world do not want these kinds of commitments to be reflected in an international agreement except when there is international financial support. For supported actions, there is more willingness to accept reporting and monitoring of commitments.

I often hear a lot of skepticism about the value of international agreements in general. In my view, however, it is important to have a legally binding international agreement. It strengthens the possibility of compliance despite reactions from national constituencies. Countries that want to be seen to respect the rule of law that feel that they have to comply with international commitments too.

James Cameron

There is quite a long lecture you could get from me about the enforceability of international law, but I am going to give you a very short version. It matters when you break the law, at whatever level. It matters if a state rejects international law for long

periods of time. They lose credibility; they do damage to themselves no matter how powerful (with a nod to one or two experiences recently). You would be surprised at how much international law is routinely enforced in everyday life that is not noticed very much, in aviation, shipping transportation, and trade. It is part of the fabric of our legal system, even in those countries that make clear separation between international commitments and domestic laws like this one.

Other countries do not make that separation. Other countries have directly effective international law, so when the state agrees to an international treaty or whoever represents the state, it automatically becomes part of the law. I would simply say that with a problem that is so obviously global, requiring global cooperation, where no country can protect itself from the consequences of climate change and no citizen can be looked after by their own state alone, it matters that you bind yourselves to others to solve the problem. And it matters if you fail to honor your commitments in law. There are places in the world where it will be easier to call to account those who make decisions in breach of the law, but in principle, a binding agreement works better than a voluntary one, wherever it is fixed to deal with this problem.

QUESTION 2: What constitutes a successful minimum threshold for a cap-and-trade system in the United States?

It is pretty likely that, if and when the United States gets around to passing a cap-and-trade bill, it is going to be flawed in some way or another. From your perspective, is there some minimum threshold in terms of substance that you are looking for? Or is anything a victory?

James Cameron

By the time the U.S. legislation is in force, when all the litigation has been settled and the wrangling over the market design is resolved – pick a date, it might be 2014 or 2015 – this means that other parts of the world will have been running cap-and-trade systems for nearly a decade. And in so doing, other parts of the world will have been looking after the interests of every U.S. citizen. Not that this features very prominently in the political negotiations in Congress, but that is the truth.

It really matters that the U.S. legislation is effective at reducing greenhouse gas emissions as quickly as possible. It also matters to U.S. business and industry that they find the means to properly value carbon in their everyday business so that the innovation and the entrepreneurship that exists in this country can be turned towards addressing this massive collective action problem. There is probably no better place on earth, apart from China, for the solutions to emerge at scale than in the United States. Indeed, Europe would like to prove this observation false by beating both to the green technology revolution.

So, U.S. legislation is in the interest of the economy at large, and in particular, in the interest of the business enterprises that are going to be successful in a future that is affected by climate change as well as energy security issues. When the United States

I would simply say that with a problem that is so obviously global, requiring global cooperation, where no country can protect itself from the consequences of climate change and no citizen can be looked after by their own state alone, it matters that you bind yourselves to others to solve the problem. And it matters if you fail to honor your commitments in law.

finally acts on this topic, it does so effectively with an agreement that makes a material difference. Soft beginnings take a long time to get up to real constraint. So, if you are making an infrastructure investment in 2013, you would be a fool not to factor in a price for carbon that would have a meaningful constraint on your decision-making, because of the length of the system. The Australian system, for example, is very gentle at the beginning but quite powerful at the end. If you are making an investment in Australia any time soon, you would be a fool not to factor in an ever-increasing price of carbon, because that is how the Australian system works over the longer term. For goodness sakes, don't waste even more time with a weak piece of legislation that doesn't come into force until 2015.

QUESTION 3: The negotiations and agreement process prior to a COP

In terms of the negotiating process, how much of the agreement is actually decided upon before the Conference of the Parties?

James Cameron

There is history here. I am not a negotiator this time around, but I will provide help and advice to delegations without actually being on one. I went to Kyoto not expecting there to be any agreement and after the first week I was totally depressed and thought there wasn't the slightest chance of reaching an agreement. And then, I don't want to over-dramatize the moment, but when Al Gore arrived it made a difference. People behaved differently when he arrived. He also came with a different message that we hadn't heard in the first week. It all came together in the last 48 hours of the negotiations, and nobody slept, and it only became an agreement because the chairman produced the chairman's text, an old trick, so that the things that we had been negotiating for the last few years were thrown away and something else magically appeared that was the deal.

Fortunately, the AOSIS (Alliance of Small Island States) that I had been representing was in the small group that did that deal, so I knew what it was. But I think 75-80 percent of the rest of the people were asleep in their chairs wondering what was going on. And it was done. And because in modern negotiations consensus is not unanimity, the chair can gavel it through. I am afraid that is how it happens, and I think it is going to happen like that again. It is so sad, so much work goes into every subordinate clause of the text. At the moment there are piles of it. And they are still in these ludicrous twin tracks. There is no way that that can be sustained, other than through some slight of hand. I happen to believe it is going to be necessary to have a slight of hand in Copenhagen.

The Kyoto Protocol people are going to have to be able to carry on on their own, without the United States, and a separate agreement will have to keep the United States in with everybody else until such time as the domestic legislation is in place. And then I expect to see them come back and converge later. Even that will not be pulled off unless the Danes, who are the hosts, have got up their sleeve the chairman's text that

will get produced at three o'clock in the morning on the last night. Only Nancy will have seen it before because the commission will be a part of that small group.

Nancy Kontou

So let's hope that President Obama comes to Copenhagen. It is interesting to see what happened last time in Kyoto, and I sincerely hope that we will have an agreement in Copenhagen too in the end.

James Cameron

It is very important to get your expectations of Copenhagen in a spot that will allow you, if you will, to recognize that the world hasn't ended if there is not a solid agreement reached in Copenhagen. The Framework Convention on Climate Change does not have an end date. The Kyoto Protocol continues to exist. There will be a Conference of the Parties in Mexico next year. There will be interim meetings of all the special committees that work on these things. The poor old carbon market will struggle on, and people like us at Climate Change Capital will still make investments, although perhaps not in the amounts we should. There is not a cliff that we all fall off if we don't get an agreement in Copenhagen. And yet, it is important that we meet the deadline. And that is where you should situate your hopes and expectations, somewhere in that space of meeting the deadline.

Bradford Gentry

For those of you who are interested in the negotiating text, there are current samples of it up on the United Nations Framework Convention on Climate Change website under the wonderful name "Non Papers."⁵ Don't print them. What they are is not so much negotiated text, but alternatives for the different sections. What is happening around the negotiations is that people are staking out their positions and understanding what the differences are, and that is a very important part of the process of coming to a conclusion. That is the first point. The second point is that everybody is saying that the deal is going to be struck in the second week when the heavyweights come in, and whether it bears any resemblance to the negotiating text or not will be subject to all the things that James laid out.

QUESTION 4: The role of forests in the climate negotiations

How do you see the conversations proceeding in regards to forest carbon emissions and sequestration credits evolving through the negotiations? In particular, do you see incentives for broader ecosystem service investments, like biodiversity plantings, coming up or changing as a result?

Nancy Kontou

Forest credits – we can talk all evening about that. I will tell you what we do in the European Union. We did not include forest credits when we revised the EU ETS, our

⁵ United Nations Framework Convention on Climate Change, Ad Hoc Working Group on Long-term Cooperative Action under the Convention. Available online: http://unfccc.int/meetings/ad_hoc_working_groups/lca/items/5012.php

EU-wide cap-and-trade system. This is not because we wanted to exclude the idea of forest credits forever, but because there were certain issues that needed to be clarified before we could safely incorporate forest credits in our system. These concern monitoring, verification of whether the reductions have been made, and permanence of the reductions.

People are looking into these issues and a lot of work has been done, but we want to be sure that all aspects have been looked at and that the countries concerned are in a position to implement the results of this work. Now, that doesn't mean that combating deforestation is not important. In fact, it is quite vital. One of the ideas we had in the European Union was to create a fund with money, for instance, from the revenues of the auctioning of allowances in the cap-and-trade system and then use that money to support projects that avoid deforestation in developing countries. Something similar is included also in the U.S. bill, a provision using the revenue from the auctioning of the allowances to support forestation projects in developing countries.

James Cameron

I will respond to this question briefly, because it is a long discussion and actually full of complexity over property rights, permanence, governance and competing aboriginal interests.

First, you need to have a fully functioning carbon market with really deep reduction targets to accommodate forest carbon. There is no point in having a discussion about what you might do with valuing carbon in forests until such time as you have deep enough cuts to create a big enough demand for the reductions. Second, if you overload the carbon market today, with a whole bunch of forest-based credits, even with some of the anxieties, you will probably redirect capital flows away from where we are actually making progress in industrial gases and energy efficiency and renewables. And it is important to fix those areas with the carbon market as it currently is.

However, it is vital to attribute value to carbon in forests. So, I actually do favor using the auctioning technique to create pools of money that value carbon in forests, provided you get a decent carbon market with enough depth to it. I also think it is possible to build that connection between forest carbon sequestered and offsets from the start in the United States, because the U.S. market, when it is done, will be huge. And from the start you can give value to forests in that kind of space and then there is a longstanding commitment to make these sorts of investments here. One of the paradoxes and ironies of the negotiations is that the United States has always been in favor of forest-based investments, while the Europeans got themselves into a position where they were, but they weren't, and they just became dysfunctional. And so we did not get forests into the Kyoto Protocol.

Ultimately, if you get a deep and liquid global carbon market that includes forestry, either by siphoning off auction proceeds to that purpose or from the start of regulation in the United States, then it will be a lot easier to take the next step. The

next step could be biodiversity or, in my view more importantly, water. Because we have global commodity markets moving vital goods around the world with very little understanding of the scarcity of water resources that support those markets and we have not figured out how to do that yet. There is a Nobel Prize out there somewhere for you guys to figure out how on earth you pick up the true value of hydrological systems in global commodity markets. But let's get carbon right first.

After the Crunch: The Future of Sustainable Investing and Carbon Finance

Cary Krosinsky

*Vice President
Trucost*

Cary Krosinsky was a member of the 70-person Expert Group in 2005 that created the Principles for Responsible Investment (UN PRI) of the United Nations, which has since been committed to by over US\$18 trillion of asset owners and fund managers. He worked in collaboration with Trucost on their award-winning 2006 UK Trust Carbon Footprint study and on the IFC-sponsored Carbon Counts Asia 2007 report. Mr. Krosinsky is an advisory board member of the Association of Climate Change Officers. He has frequently written and lectured as a leading interpreter of the intersection of ownership and the environment and teaches the course "Sustainability & Investing" at Columbia University.

Nick Robins

*Director
HSBC Climate Change Centre of Excellence*

*Nick Robins has 20 years of experience in the policy, business and investment implications of sustainable development and climate change. He has worked at the Business Council for Sustainable Development, the European Commission, as well as the International Institute for Environment and Development. In 2000, he joined Henderson Global Investors as head of SRI research and became head of SRI funds, shaping the Industries of the Future strategy and launching the first carbon audit of an investment fund. He is a member of BT's CSR panel and GE's Corporate Citizenship advisory panel. In 2009, Mr. Robins received the Extel award for the best analyst for integrated research on climate change. He is the author of *The Corporation that Changed the World: How the East India Company Shaped the Modern Multinational*.*

*Messrs. Krosinsky and Robins are co-editors of *Sustainable Investing: The Art of Long Term Performance*.*

April 7, 2009
6:00 to 8:00 p.m.
Steinbach Lounge
52 Hillhouse Avenue

Chapter 9

After the Crunch: The Future of Sustainable Investing and Carbon Finance

Cary Krosinsky
Vice President
Trucost*

Nick Robins
Head, Climate Change Centre of Excellence
HSBC**

In this chapter, Nick Robins and Cary Krosinsky update their publication “Sustainable Investing: The Art of Long Term Performance” to frame alternative investing in a macro and micro economic perspective. The chapter begins by outlining the current landscape and strategy for sustainable and responsible investing (SRI), followed by a granular look at its implementation. Throughout the chapter, the contemporary context of financial distress is recast as an opportunity to reform markets and restructure the investment landscape for longer-term value creation. The main focus of SRI to date has been on listed equity markets, but future growth is expected in unlisted assets such as private equity, infrastructure, forestry, and land.

* For more information on Trucost, please go to www.trucost.com

** For more information on HSBC, please go to www.hsbc.com

OVERVIEW

Nick Robins

In our book *Sustainable Investing: The Art of Long Term Performance*² Cary Krosinsky and I brought together leading global practitioners to discuss how non-financial factors can be successfully integrated into investment strategies to generate long-term financial return. In this chapter, we provide a macro picture of sustainable investing,

¹ Nick Robins’ talk represents his personal perspective and not the opinions of HSBC.

² Cary Krosinsky and Nick Robins. November 29, 2008. *Sustainable Investing: The Art of Long Term Performance*. Earthscan Publications Ltd.

but with a particular reference to the current recession and stimulus plans. We then turn to a more micro level analysis of fund performance and how carbon emissions and credits can affect fund analytics.

SUSTAINABLE INVESTING: THE MACRO PERSPECTIVE

The 2008 credit crunch can best be viewed as one of the first crises of global unsustainability – with energy insecurity, water stress, widening global poverty, and climate change following close behind. We have learned that the financial system does not tend towards equilibrium, that markets are not necessarily efficient, and that market participants are not as rational as once believed. As General Electric commented in its 2008 Corporate Citizenship report: “Financial markets must be reset to enable long-term sustainable performance in the real economy. This means less leveraged finance, a fundamental repricing of risk, the ability to account for externalities like greenhouse gas emissions and a realignment of executive responsibility and compensation with long-term performance.”³

Sustainable investing is focused on the long-term. This is not a new concept – and indeed was a fundamental part of the critique developed by John Maynard Keynes in the 1930s. In words that still echo today, Keynes wrote in his book *The General Theory of Employment, Interest and Money* that “it is the long-term investor, he who most promotes the public interest, who will in practice come in for the most criticism wherever investment funds are managed by committees or boards or banks.”⁴

Today, the short-term mentality associated with investing has grown more intense, driven by a combination of deregulation and greatly enhanced computing power. These two factors have driven down the cost of trading, with the inevitable, though perhaps unintended, consequence of accelerating the turnover of shares. Stock market turnover in the U.S. has, for example, increased from 25% in 1986 to 150% in 2004⁵ – meaning that an equity portfolio gets turned over 1.5 times per year. In this context, incentives are geared towards quarterly and annual out-performance. In the context of holding shares for less than a year, how can investors really think about long-term drivers of value, climate change factors, human capital, and social factors? Conventional wisdom teaches that, in such an environment, it makes no sense to address structural issues such as climate change. Even with the introduction of carbon pricing systems, asset prices do not reflect ecological or social costs. Market behavior discounts the long term, driving capital misallocation on a large scale.

However, capital markets are not just myopic – they also fail to account for ecological or social costs in the valuation of investment assets. Carbon pricing remains marginal to the bulk of equity and credit valuations. Many other key environmental factors, such as water stress and biodiversity loss are also not recognized. As a result, there has been a massive misallocation of capital, most notably towards the extraction of fossil fuels. In conjunction with Henderson Global Investors and Trucost, I analyzed the carbon footprint of the top 100 listed companies in the U.K. The results showed that while the U.K. is responsible for just 2 percent of

³ General Electric. 2009. 2008 Corporate Citizenship Report, Fairfield, CT. http://www.ge.com/files_citizenship/pdf/reports/ge_2008_citizenship_report.pdf

⁴ Keynes, J.M. 1936. *The General Theory of Employment, Interest and Money*. Macmillan, London.

⁵ Bogle, John C. 2005. *The Battle for the Soul of Capitalism*, Yale University Press, New Haven.

In the context of holding shares for less than a year, how can investors really think about long-term drivers of value, climate change factors, human capital, and social factors?

the world's carbon emissions, the emissions from the facilities and products of just five fossil fuel companies listed on the London Stock Exchange – Anglo, BP, Rio Tinto, Shell, and Xstrata – account for over 10 percent of the global total. With the latest science suggesting that half of current recoverable fossil fuels will need to remain in the ground to prevent catastrophic climatic change, the supposed value of these assets is in need of urgent review.

Ultimately, these fault lines place the stability of the financial system at risk. In 1997 Munich Re stated that, “According to current estimates, the possible extent of losses caused by extreme natural catastrophes in one of the world's major metropolises or industrial centers would be so great as to cause the collapse of entire countries' economic systems and could even bring about the collapse of the world's financial markets.”⁶ This quotation is interesting for several reasons. First, it is from Munich Re, one of the world's largest insurance companies. Second, it was made in March 1997. Even as of 1997, Munich Re was warning about the potential collapse of entire countries' economic systems and the collapse of the world's financial markets as a whole. Since then, climate change science has become even stronger. A recent report⁷ by the Organization for Economic Cooperation and Development (OECD) concluded that by 2070, \$35 trillion in assets could be at risk from coastal flooding due to climate change, with the exposure greatest in Asia (notably Hong Kong, Shanghai, Calcutta, and Mumbai), along with New York, and Miami in the United States.

The good news is that the momentum in favor of SRI strategies has gathered pace over the past five years. To give a sense of the scale of emerging commitment:

- over \$13 trillion in assets under management (AUM) is supporting an investor statement calling for an ambitious climate deal at Copenhagen.
- over \$18 trillion in AUM is now signed up to the UN Principles for Responsible Investment.
- over \$57 trillion in AUM supports enhanced corporate reporting on climate change through the Carbon Disclosure Project (CDP).

In many ways, the onset of the credit crunch followed by economic recession has reinforced efforts to align sustainability and capital markets. First, there is growing awareness that tackling climate change will require an unprecedented mobilization of investment. In 2008, global clean energy investment stood at \$155 billion. However, in the International Energy Agency's (IEA) Energy Technology Perspectives report, it is suggested that about \$1.3 trillion will be needed each year on average between 2005 and 2050 to halve global emissions from energy by 2050. Second, increasing linkages are being made between economic recovery and climate change issues. There are strong correlations between the management of systemic risk and failure in the financial markets. Climate change poses systemic risk. Actions to address climate change will reinforce energy security, create jobs, lead to the next phase of productivity, and kick-start the transition to a low carbon economy.

HSBC estimates that about \$445 billion of fiscal stimulus has been allocated in nearly 20 countries to climate change investment themes. This represents 15 percent

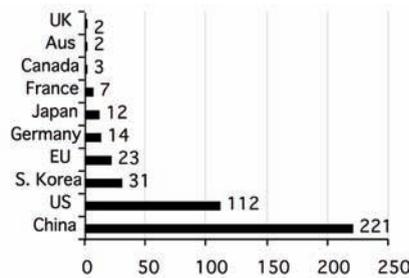
⁶ Munich Re. 1997. Topics 1997: Natural Catastrophes. Munich Re Group.

⁷ Nicholls et al., Ranking of the World's Cities Most Exposed to Coastal Flooding Today and in the Future, OECD, Paris, 2007 at <http://www.oecd.org/dataoecd/16/10/39721444.pdf>

Even with the introduction of carbon pricing systems, asset prices do not reflect ecological or social costs. Market behavior discounts the long term, driving capital misallocation on a large scale.

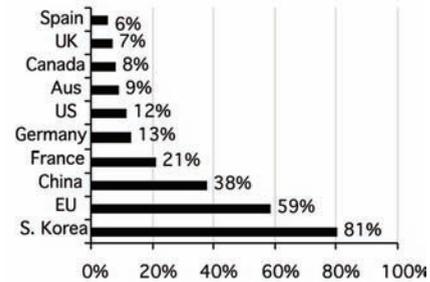
of total stimulus funds. While China and the U.S. lead in terms of stimulus funding, each country has very distinct strategies to investing their stimulus funds. China is bringing forward infrastructure investments, notably in rail, water and grids. The U.S. stimulus plan is more diverse, with large allocations to renewables, building efficiency, low carbon vehicles, smart grids, and water. Perhaps South Korea is the most intriguing example – with the government allocating over 80 percent of its stimulus to ‘green’ themes. Climate change and clean energy are no longer regarded as matters to be confined to a box labeled environmental protection, but are increasingly seen as matters of economic strategy.

Figure 1 Green stimulus regional ranking as percentage of total stimulus



Source: HSBC

Figure 2 Green stimulus regional ranking, USDbn



Source: HSBC

There are strong correlations between the management of systemic risk and failure in the financial markets. Climate change poses systemic risk.

Green stimulus alone is insufficient to achieve durable change in either the real economy or investment markets. It needs to be matched by structural reforms in the way that the stocks and flows of natural and social capital are routinely evaluated and integrated into decision-making. A deal at Copenhagen will be important for investor sentiment – more important still will be translating high level political commitments into regulations and markets that move capital. We are confident that sustainable investment will become the new norm over the next decade – driven by changing market realities and pulled by evidence that it delivers risk-adjusted returns.

SUSTAINABLE INVESTING: MICRO PERSPECTIVE

Like Keynes’ long-term investor, the sustainable investor – s/he who best tries to align investment practice with environmental and social realities – has often been seen to be “eccentric, unconventional and rash in the eyes of average opinion.”⁸ However, for us, sustainable investing is best seen as an investment discipline that explicitly considers future social and environmental trends in financial decision-making. By anticipating these trends, sustainable investors seek to identify “predictable surprises” ahead of the market. Sustainable investing is now practiced across all asset classes – listed as well as private equity, fixed income, property, infrastructure, and commodities – and in all regions. While ethical or socially responsible investing is

⁸ Keynes (1936)

driven by the values of the investor (from the inside out), sustainable investing is addressing changing external realities (from the outside in).

Looking across current investment practice, there are at least seven different approaches used by socially responsible investors:

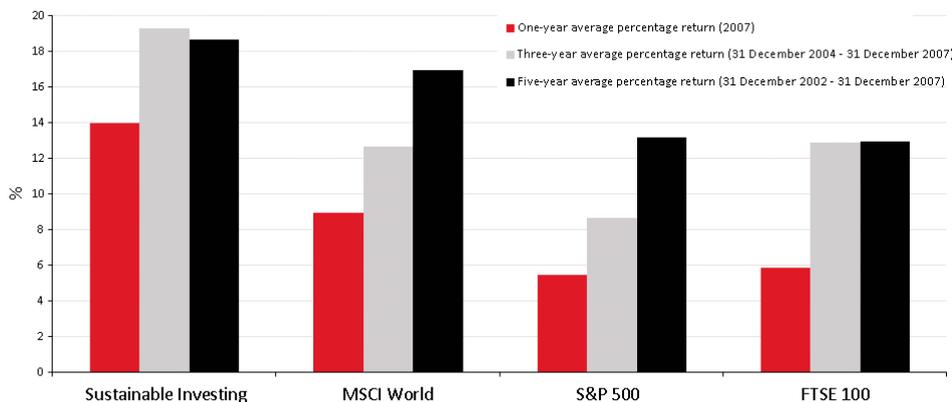
1. Negative ethical, environmental, and social screening.
2. Positive ethical, environmental, and social screening.
3. Community investing.
4. “Best in class” portfolio construction.
5. Clean tech and sustainability themes.
6. Integrating ESG factors.
7. Shareholder activism and engagement.

Broadly, we would classify styles 1-3 as ethical investing and styles 4-6 as sustainable investing; style 7 is governance rather than an investment approach. Historically, SRI started with ethical screening and this accounts for the bulk of the \$5 trillion in global SRI. However, there is an increasing shift towards sustainable investing strategies, led by investors in Europe.

Traditionally, one of the biggest obstacles to the spread of SRI has been the assumption within the investment mainstream that integrating non-financial factors in decision-making would inevitably harm returns. To test this, we studied the performance of the world’s global SRI funds, dividing funds that took a negative screening and a sustainable investing approach. All funds reviewed in the study had to be equity focused, have \$100 million or more under management, and have existed for five or more years to ensure a reasonable track record for analysis. One hundred and thirty-five funds met these criteria at the end of 2007 and were included in the study. The study showed that sustainable investing is actually outperforming the S&P 500 and MSCI World. Interestingly, negative screening underperformed MSCI World and matched mainstream performance at best.

While ethical or socially responsible investing is driven by the values of the investor (from the inside out), sustainable investing is addressing changing external realities (from the outside in).

Figure 3 Anticipating that the future matters

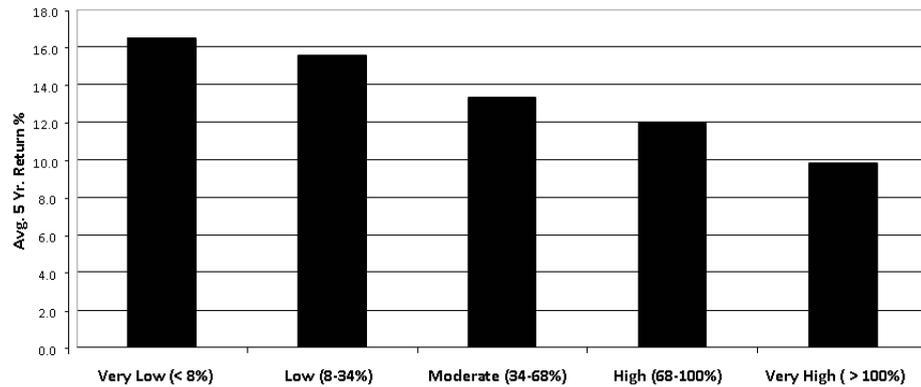


Source: Krosinsky and Robins (2008)

Figure 3 shows 1, 3, and 5-year performance. In positive economic times, sustainable investing has outperformed. In fact, we recently published an analysis that showed outperformance for the 5 years ending 2008, as well as the first half of 2009, therefore pre-crisis, through the crisis, and afterwards as well.⁹

The study also found that funds with lower turnover – and thereby a longer-term perspective – tended to outperform, vindicating Keynes' analysis (Figure 4).

Figure 4 Fund performance by turnover



Source: Krosinsky and Robins (2008)

The study also identified the most commonly owned stocks in sustainable investment portfolios: most of them are European (Table 1).

Table 1 Most commonly owned companies by SRI funds

Vestas Wind Systems	Denmark
Veolia	France
Novozymes	Denmark
Solar World	Germany
Gamesa Corp Tech	Spain
ING	Netherlands
Schneider Electric	France
BG Group	UK
Nokia	Finland

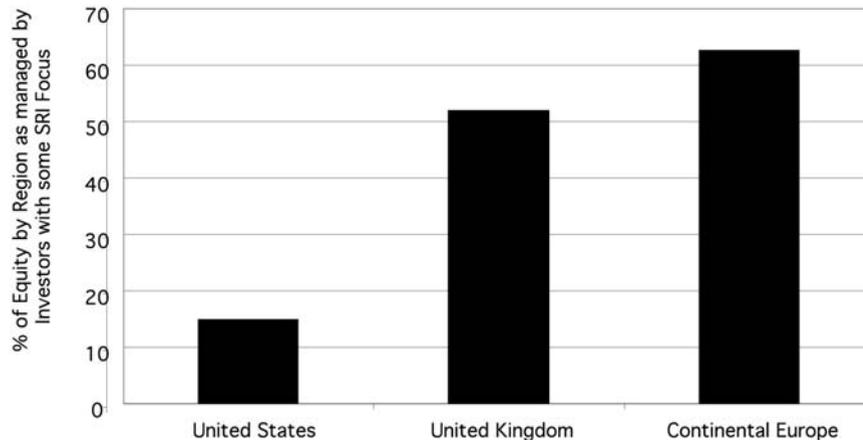
Source: Krosinsky and Robins (2008)

Sustainable investing is a self-reinforcing process – with active investors encouraging companies to strengthen their non-financial management. In continental Europe, the percent of company ownership by SRI investors is over 60 percent; in the United States, this falls to just 15 percent (Figure 5). This might explain why Europe has been a first-mover in this space.

⁹ <http://www.unpri.org/academicog/agenda.php>

The study showed that sustainable investing is actually outperforming the S&P 500 and MSCI World. Interestingly, negative screening underperformed MSCI World and matched mainstream performance at best.

Figure 5 Regional focus on socially responsible investing



Source: Krosinsky and Robins (2008)

CARBON INTENSITY AND SHAREHOLDER INFLUENCE

In early 2009, Trucost released a report in conjunction with Lipper called Carbon Counts USA.¹⁰ In this report, Trucost studied the carbon intensity of the 75 largest U.S. mutual funds and the 16 largest sustainability/SRI funds.

Interestingly, one of the most carbon intensive funds from the entire study included an SRI fund, Sentinel Sustainable Select Core Opportunities. The most carbon intensive fund was the iShares FTSE/Xinhua China 25 Index Fund, which is not extremely surprising since the world's most carbon intensive companies are Chinese coal companies.

In June 2009, Trucost also issued a report analyzing the carbon intensity of companies in Standard & Poor's 500 Stock Index. Our analysis indicates that profit and valuation risk will vary greatly under the type of global cap-and-trade program that will likely emerge post-Copenhagen. The companies with the largest emissions by sector are not surprising: Exxon Mobil, Alcoa, and Wal Mart, for example. Wal Mart has the largest absolute emissions footprint of any company in the S&P 500. Consequently, they are now paying a lot of attention to their footprint, as they see it as a financial opportunity for the company. The relative carbon intensity of companies is becoming an increasingly important factor for their investors to consider, especially as it pertains to how a price on carbon might affect these company's earnings. Entire business models start to come into question – for example, coal burning utilities.

CONCLUSION

In the 21st century, successful investment depends on identifying assets that yield a good return. Doing this depends on a vigorous population of enterprises, which depends on a healthy macro-economy, which depends on a healthy civil society,

¹⁰ www.trucost.com

The percent of company ownership by SRI investors is over 60 percent; in the United States, this falls to just 15 percent. This might explain why Europe has been a first-mover in this space.

which ultimately depends on a sustainable planet. Our analysis suggests that sustainable investing is already an out-performing strategy. The regulatory, market, and social tailwinds currently in its favor are likely to grow stronger in the aftermath of the current crisis. We started writing *Sustainable Investing* as “credit crunched, and we end[ed] it as long-standing financial institutions disappeared, having failed either to link reward with responsibility, or to appreciate and properly manage systemic risk. The scale of the investment transformation ahead demands a new paradigm. The challenge for sustainable investing is not to become like today’s mainstream but, rather, to replace it.”¹¹

Universities and foundations have the intellectual capital and strategic focus to contribute greatly to this transition. As Matthew Kiernan wrote in his book, *Investing in a Sustainable World*, “were the Yale Endowment to even publicly consider integrating sustainability considerations into its investment process, the positive impact on its peers worldwide would be immense.”¹²

¹¹ Cary Krosinsky and Nick Robins. November 29, 2008. *Sustainable Investing: The Art of Long Term Performance*, Earthscan Publications Ltd.

¹² Matthew J. Kiernan. November 12, 2008. *Investing in a Sustainable World: Why GREEN is the New Color of Money on Wall Street*, AMACOM.

Looking ahead, there are perhaps five critical themes for the future evolution of sustainable investing:

1. The reform of global equity markets to provide meaningful incentives for long-term investing. Important steps along the way could include revising tax, dividend, and voting policies to encourage greater focus on ownership rather than trading.
2. The need to make capital markets “fit for purpose” for a low carbon economy, in particular reforming listing, disclosure, and accounting rules to fully integrate climate change factors.
3. Broadening the focus of sustainable investing away from traded markets and towards real assets such as infrastructure, forestry, and land – assets that have the potential of aligning long-term investment with environmental stewardship.
4. Harnessing the ingenuity of financial markets to provide solutions to the world’s pressing sustainability issues. One rising issue of importance is how to issue a new generation of “climate bonds” to finance the rapid deployment of renewables, energy efficiency, and sustainable forest management.
5. The investment community also needs to become more transparent about its sustainability and climate change performance. To date, investors have successfully shined the lamp on corporate behavior. It is now time to assess performance and publicly report as part of the investment community’s accountability to climate change.

Question & Answer Session

QUESTION 1: International agreement on climate change

What is the possibility that the U.S. and China will agree in principle to a global climate regime in Copenhagen this year?

Nick Robins

A deal will be done in Copenhagen, even though a number of factors are opposing this. In short, the political consequences of failure have become so high that no state wants to be blamed for causing a breakdown. A number of key emerging economies, such as China, India, Mexico, and South Africa have made important commitments to clean energy and carbon control. However, domestic political dynamics in the United States make bold action difficult to deliver. I believe that a framework agreement will be reached. It won't, however, be comprehensive and it will take at least a year or two to flesh out the details.

QUESTION 2: Approaches to investor engagement and impact

In the near term, do you think SRI funds and sustainable investing funds should be more focused on affecting share prices by investing in companies or carrying out shareholder resolutions and putting pressure on management? Which approach will result in greater impact?

Cary Krosinsky

There is a myth that there are only two ways to invest: either be an investor who walks away from a firm when you don't like the company; or be an engaged investor that puts forth resolutions and struggles to change firm practices. However, there is a more interesting way in the middle, whereby you act as an active investor and make your views known as an active investor. Companies respect it. If investors engage with a company and have a positive response, they may increase their number of shares. Normal investors engage with management and are able to see if they like a firm's dividend, research and development, or cost control policy.

Similarly, if investors engage in the company and actually have less confidence in company management than when they started, they will reduce their holdings or sell out. There is no real consequence of companies not responding. Therefore, a blended approach is not only more honest, but also has a bigger impact.

QUESTION 3: Large versus small market capitalization firms

It seems that many of the sustainability funds today tend to be more weighted towards small cap and higher beta stocks. As a result, it would be expected that their returns, particularly in good times, would outperform the S&P 500. It appears that this is both the strength and limitation of the asset class, because investors want to benchmark against something they understand. If the benchmark is the S&P, these funds are going to have different characteristics and people will be cautious about making large

commitments to these funds. At the same time, most sustainability funds invest in small firms. How do we get out of this trap? Did your analysis factor in sector weighting, beta adjustments, and market capitalization?

Cary Krosinsky

The kind of transformation that Nick Robins spoke about applies mostly to large-cap firms. Green stimulus money will go, in effect, to larger companies evolving into those strategies. There may not be a way out of that trap other than getting the larger companies to transform. To what degree we can transform mainstream corporate culture remains to be seen. Sustainability is something that needs to be integrated into the fabric of companies. If you buy and hold the right companies, you might find that your investment doesn't necessarily fluctuate as much as it might have, and that you might actually have some chance for both alpha and beta.

Nick Robins

HSBC has designed a climate change index, which looks across 65,000 listed companies around the world and identifies those with a material portion of revenues from climate change goods and services, such as renewable energy, energy efficiency, waste management, and so on. The result is that around 4 percent of market capitalization is already linked to climate change solutions. Large firms, such as Siemens and GE, are focusing research and development and merger & acquisition on sustainability concerns. The issue is to what extent those are material drivers of the overall business. The challenge is deciding between focusing on a few companies that have large market capitalization now or firms that are small but growing.

Cary Krosinsky

If you are trying to innovate and create solutions with a startup, by definition you are going to be small. It might be difficult unless it is a larger company that is doing the innovation. IBM is trying to provide new greener solutions from which to drive future revenue. It might be harder for companies to move in that direction. GM has learned that in that respect it would have been better to move sooner than they did.

QUESTION 4: Investment time frame

Could you talk more about the time frame under which investments and transactions currently take place? How do we need to reframe this in order to create opportunities for long-term commitments? Do quick transactions create efficiencies in the market that are necessary for sustainability to make sense?

Cary Krosinsky

Our data showed that investors who did not constantly churn performed better. To a certain degree, there are strategies that require a churn and that by definition will require rapid trading. We are not suggesting that sustainability can apply to these strategies. However, the data suggests that investors should invest in a long-term fashion. Warren Buffett has demonstrated the success of a long term buy and hold strategy.

Nick Robins

Quick transactions are a result of a massive increase in cheap computing power linked with deregulation of financial markets. These drive down trading costs, and with cheaper trading, more trading is expected. Moreover, performance management culture is on a quarter-by-quarter basis.

Short-term investment strategy is among the greatest barrier to sustainable investing – even if the evidence is there that it delivers out-performance. We need to consider weighting dividend policies towards long-term owners, as well as changing taxes on trading and capital gains, so they are geared towards encouraging real ownership. Modernizing performance management is another priority so that fund managers are rewarded for looking beyond the next quarter.

QUESTION 5: Individual versus institutional investors

How successful and/or feasible do you think socially responsible investing could be on an individual rather than institutional scale?

Cary Krosinsky

Sustainable and responsible investing strategies have been successfully applied for individuals and institutions. The main difference relates to the degree to which investors can apply their own values to investment decision-making. For individuals, ethical, religious and environmental factors are part of basic consumer choice. However, for institutional investors, fiduciary responsibilities mean that environmental, social, and governance factors need to be linked with value creation rather than values per se. In the past, fiduciary duty has been used as an obstacle to action – but now the benefit of the doubt is shifting so that institutional funds that do not take account of ESG factors are increasingly being viewed as irresponsible.

Nick Robins

One of the key challenges for individual investors is that there are no market standards defining SRI. In the food market, organic produce needs to be certified that it meets independent organic standards. There is nothing equivalent for SRI, leading to a welter of overlapping terms, potentially creating considerable consumer confusion.

One way out of this is not to spend inordinate time trying to agree a common definition for SRI – but to get providers to clearly report back to investors on the ESG performance of their funds. This would help to counter what we call “SRI style drift” – where funds claim to be caring for the climate, but have large holdings in fossil fuel companies.

Cary Krosinsky

We actually found that one of the largest SRI funds in the United States was, by some measure, more carbon intensive than the S&P 500. It is important to actually look at what the funds are doing from an ownership standpoint. You might think that a fund is investing with your values in mind, but you may be surprised to find out what they own.

QUESTION 6: Clean and conventional energy divergence

In the last couple of years, it seems that clean energy stocks tracked the conventional energy sector in terms of energy prices. When prices were high, clean energy was in vogue, and under current conditions, interest has dropped. Do you think at some point this will change and there could be a strategy developed around potentially shorting carbon intensive energy stocks while promoting clean energy? When will the fortunes of those two sectors diverge, if ever?

Cary Krosinsky

Long-term trends are in favor of clean energy. In the power sector, 2008 was the first year where investments in renewable electricity outpaced fossil fuels. Hedge fund strategies are already being deployed in the energy arena using a variety of long-short techniques.

QUESTION 7: Relying on market solutions to climate change

Can we rely entirely upon market forces for an environmental and energy revolution? It appears we have two acute narratives: On one hand is the issue of energy dependency and the potential rupture of the U.S. economy; and on the other hand is global climate change. About three years ago James Hansen warned about the tipping point and gave us about a 10-year window. Three of those ten years are gone and we have not done enough. Can we do this by market forces and market incentives alone, or do we need something else? If we do need something else, what would it be?

Nick Robins

As Sir Nicholas Stern has stated, climate change is the biggest market failure ever, aggravated by a series of policy failures – not the least is substantial subsidies for fossil fuel sectors. We need considerable policy, market, and institutional reform over a sustained period of time to drive the transition to a low carbon economy – taking care to measure and communicate the co-benefits that flow in terms of enhanced efficiency, new jobs, better health, and reduced import dependency as well as reduced pollution. Carbon pricing and carbon markets are just one part of this shift – and need to be buttressed by energy efficiency standards and R&D programs to accelerate the design and deployment of breakthrough technologies.

Cary Krosinsky

The credit crunch has called into question the fundamental principles of the post-Cold War model of free market capitalism. We need a better mix of private enterprise, public investment, as well as social innovation to build markets that are resilient and deliver the goods.

QUESTION 8: Coal and SRI

Although we've discussed many interesting ideas related to sustainability, it seems that the 800-pound gorilla in the room is coal. Coal is cheap, plentiful, and happens to be physically located in developing countries that will be significant users of energy, like

India and China. What is the future of coal? From the perspective of environmentally and socially responsible investment, what role is coal going to play in the world and how do we manage its use?

Cary Krosinsky

If we burn the remaining reserves of coal, natural gas, and oil, we will have a catastrophic rise in global temperatures. We need to build a bridge between today's fossil fuel dependent economy and one that prioritizes efficiency and renewables. A key question that remains unresolved is the role of carbon capture and sequestration. Even with a fully operational cap-and-trade regime, carbon capture and storage would need additional support to bring down investment costs. It remains to be seen whether it can be developed at scale and cost.

Nick Robins

The challenge is whether renewable energies deployed through smart grids to energy efficient users can meet the demand for "base load" power and replace coal. The ideal would be a strategic technological deal between the U.S. and China in Copenhagen to find ways of mobilizing clean, cost-efficient energy to drive down demand for coal use.

QUESTION 9: SRI for institutions

I'm part of a group at Yale that encourages the university to invest in ways consistent with Yale's institutional values. The biggest problem we face is absolute return asset classes and how to rectify short-term perspectives with the values of the institution.

Cary Krosinsky

The managers of Yale's endowment deserve a lot of credit. At times they have been in the top 1 percent of best performing investors. They have grown the endowment substantially. However, a certain level of investment transparency would be good.

Nick Robins

I'd turn the question around. Endowments and institutional investors are the clients of an assortment of asset managers. Clients wield power. If clients have a clear investment policy that prioritizes environmental, social, and governance factors in their long-term returns, they can require fund managers to incorporate this policy into their investment portfolios. Clients can require quarterly and annual reports from fund managers that demonstrate how these factors have been integrated into investments. Highly paid hedge fund managers will have to scratch their heads and come up with answers. It sets a powerful ball in motion.

Bringing Security to Forestry Investors Worldwide

Phil Cottle

*Managing Director
ForestRe*



April 22, 2009
5:30 to 7:30 p.m.
Burke Auditorium, Kroon Hall
195 Prospect Street

Phil Cottle has over 27 years of experience in forestry risk assessment and design for brokers, forest corporations, Lloyd's Syndicates and continental reinsurers. He is an innovator in establishing forestry insurance schemes and a regular speaker on aspects of forest risks and risk management. He has taken a leading role in recognizing and writing about the impacts of climate change on insurance and forest companies.

Mr. Cottle has provided forestry and crop risk assessment consultancy services in over 50 countries for syndicates in Lloyd's of London, as part of Aon's Agricultural Risk Management team. From 2000 to 2003 he served as the advisor on forestry for PartnerRe, a major global reinsurance company. He also advised PartnerRe's Board on the physical, legal and financial liabilities arising out of climate change for insurers and has published various papers on this topic. Mr. Cottle has been responsible for planning and implementing national provincial crop and forestry insurance schemes, including the first forestry scheme for Spain and for Indonesia (the National Indonesian Tree Crop Programme). He has also worked in the development of crop insurance schemes for Malaysia, Syria, Sudan and forest provincial fire fighting cost protection in Alberta Canada.

Mr. Cottle began his career with 15 years in agricultural extension and rural development in the Pacific Islands, Central Africa and the U.K. He holds a Masters in Agricultural Extension and Rural Development, with a B.S. in Agriculture and Tropical Crops from Reading University.

Chapter 10

Bringing Security to Forestry Investors Worldwide

Phil Cottle
 Managing Director
 ForestRe*

This chapter discusses the potential and challenges in bringing insurance-based risk management tools to the forestry sector. The author begins by addressing the scope of insurance generally, and then builds on this framework through a forest-specific lens, citing examples and considering risk trends unique to this application. Towards the end, he introduces the reader to possible future forest carbon insurance products, highlighting the market need that such products would aim to fulfill.

* For more information on ForestRe, please go to www.forestre.com

INTRODUCTION AND BACKGROUND

It's a pleasure to be here. Thanks very much for inviting me.

This evening, I will run through a number of topics. I will start by giving an outline of what ForestRe does, why I think it adds value, and what insurance is really about for the forestry sector. We will then look at risk trends, which is key to our insurance hearts. We are practitioners and every day we price risk. We'll discuss the methods that we use in ForestRe to do that. Then, right at the end, we will try to understand the forestry carbon sector, where we would like to go with it, and perhaps how we might get there.

In a nutshell, ForestRe is like an agency. We are not insurers ourselves and we do not have the capacity to be underwriters. However, we do all the work as if we are underwriters. We do the whole process and then go to Lloyd's in London where we have six syndicates providing risk capital behind the insurance product. We make the case to these Syndicates to underwrite the forest. One hundred percent of our income is dependent on covering risks in forests.

Our task is to try to put parameters around forestry risk and understand the risk trends. We try to allocate insurance capacity correctly. While we always look back at data, we also always look forward to see what we think is going to happen in the future. Many of our clients are the large forestry corporations that want to cover not the day-to-day risk, but the catastrophic risk that can seriously impact their investment and performance. We have been working on forest carbon delivery insurance since about 1998, but it is only now that we get a sense of movement in the market where we may be able to do something sensible.

For whom do we do this? Ideally we like small portfolios with a large number of small growers. However, we also go right through to large forestry companies, corporations, and governments. We have worked with a variety of entities and each entity has its own particular needs. Unlike buying car insurance, each of these policies is designed on its own merits; each policy is tailor-made to our individual clients.

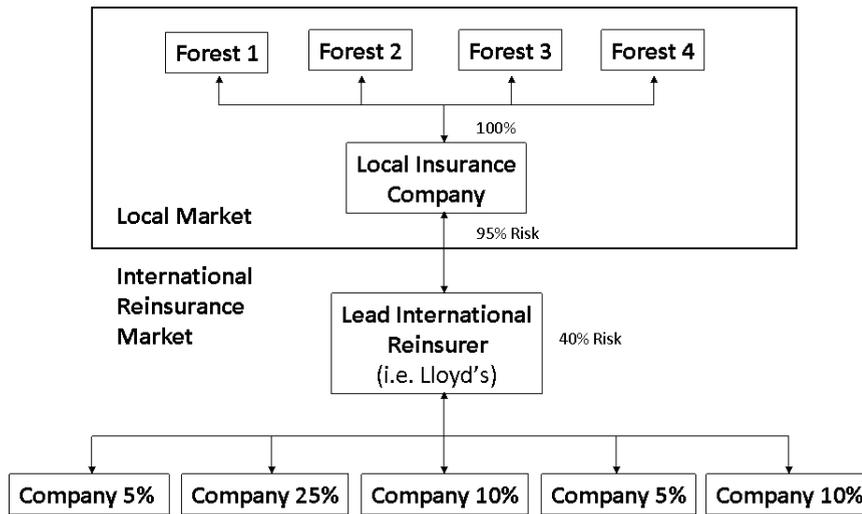
We have looked at forest risks in many parts of the world. The key areas for us historically are Australia, South Africa, Chile, Argentina, and, increasingly, Brazil. We had only one client in Russia, but I think there are several coming up. We are now trying to break into the U.S. market. When I say break in, I simply mean that we are trying to find the right solution where the price of insurance meets the needs of the industry given the risks they face, in the absence of a forestry insurance industry in the United States.

We are available to anyone. Most commonly, however, we are contacted by brokers, such as local brokers in São Paulo or London, indicating that they have a risk they want to place. The potential clients contact us, we analyze their risk, and once we have done our pricing and structuring, we go to Lloyd's, our key capacity provider. While it is not easy for us to place U.S. forest hurricane risk with Lloyd's under our present arrangements, we do have access to other international reinsurers who are able to do so. We work with everybody and see ourselves very much as a mobilizer to generate an awareness of forestry risk and the availability and benefits of forest insurance.

The full relevance of Figure 1 will be understood later. For now, it highlights that, traditionally, there is a local market operator insuring a number of forestry risks. Due to lack of expertise, this local insurer tends to reinsure most of the risk out. In this example, 100 percent of the risk goes to the local insurance company that in turn pushes 95 percent of the risk out into the international markets. The lead reinsurer may be Lloyd's, which might take a percent (say, 40 percent) and then share the rest of the risk across the market. The risk is syndicated around the world with the other big firms that insure forests on a regular basis.

While large investors have their risk spread via diversified portfolios, they are often managing large numbers of individual, relatively small forests for private owners. Such small companies may have a low tolerance for losses that need insurance protection. So, while the institutional investor may not need insurance, their forest managers/investors may.

Figure 1 Proposed forestry insurance market – sharing risk internationally



ROLE OF INSURANCE

There is a range of risks affecting forestry projects. Figure 2 highlights those that are commonly insured by the market. In terms of forestry, it is an immature market and we are pursuing the concept that we can de-risk the investment. Certainly, financiers unfamiliar with forestry see them as an unknown (thus possibly high-risk) opportunity. And like other institutional investors, they are considering forestry, particularly now that other investment markets have delivered significant losses, as a safe place for your investment over the long term for a variety of reasons that we do not have time to explore here.

The object of insurance is to de-risk the forestry investment and take away the fear that a disaster that might negate forestry returns. It's insured. Everybody's relaxed. It's a very simple, simple concept. We try to decrease the volatility of investment in forestry.

If you are a large, billion-dollar institution, your losses each year might be between zero and US\$3 million or something like that. However, occasionally you get a \$5 million or larger loss event such as US\$30 million experienced in 2007 by one timber real estate investment company. Our role is to remove those high losses and leave the smaller losses with the institution because they can manage those within their day-to-day budgets. Large losses hit the returns on the investment, and if it is a short term investment, leave little time to recoup the loss by natural growth.

The losses in forestry are not just the trees. They are all the added items such as increased costs of labor, debris removal, etc. If you are looking at carbon, it is much the same, but with one big difference: the liability for carbon delivery is more than just the rotation of the forest. Because of this, we have to take a different view as to how that delivered carbon can be covered and replaced. Many losses in normal forestry projects can be removed through the lifecycle, the rotation, but with carbon the liability is there for 100 years. The key concern is how to address that loss.

Our role is to remove those high losses and leave the smaller losses with the institution because they can manage those within their day-to-day budgets. Large losses hit the returns on the investment, and if it is a short term investment, leave little time to recoup the loss by natural growth.

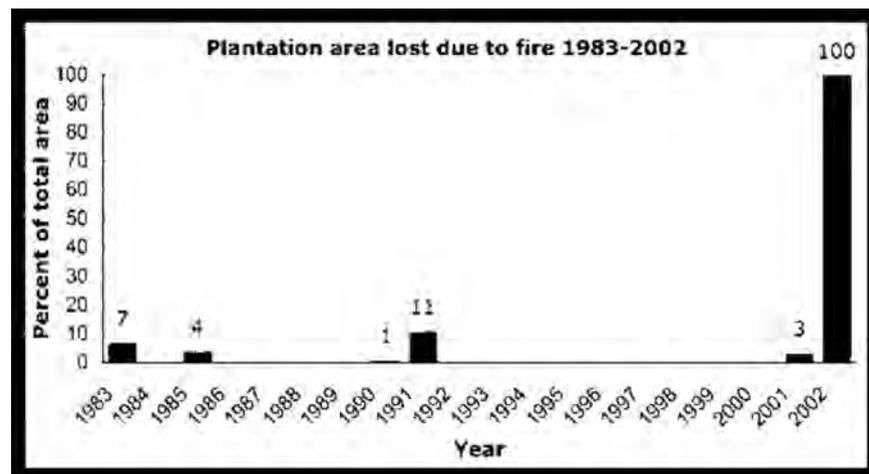
Figure 2 The role of insurance in enterprise risk



Finance Key = *Insurable risks*

Figure 3 is a graphic example of a catastrophic loss. This example is taken from an Australian state forestry enterprise where we have records from 1983. In 2002, 100 percent of the forest area burned, which changed the average annual area lost from 1.17 percent to closer to 5 percent. Once again, our role is to take away or to mitigate that catastrophic loss.

Figure 3 Plantation area lost 1983-2002



Source: ForestRe

STRUCTURING FOREST ENTERPRISE INSURANCE AND THE NATURE OF RISK

Insurance is easy to understand. Financial products can be complicated and there is sometimes no realistic basis on which to price them. With insurance, there is hard data about frequency and severity of losses. This provides a sound basis for pricing the underlying risk.

One of the biggest issues here in the United States is that people do not know that forests can be insured. In most businesses, the greatest competitor is ignorance rather than the ability to actually do the job and provide the product. For large organizations, our challenge is to match the price of protection to returns. If a firm is seeing returns of five percent, and an insurance premium costs one percent, then it may be out of kilter. We need to match those two factors, costs and returns, and we therefore approach structuring the product from two sides – what the insurer needs in order to release his capacity for the risk and what the investor perceives as a fair exchange of returns for the benefit of removing volatility in his returns.

Limited capacity

Finding insurers for forest risk is not as easy as one might think. Globally, there are only about seven companies that understand to some extent the risk in forestry and that currently reinsure forestry. These firms are Munich Re, Swiss Re, Hannover Re, Lloyd's, Scor SE, Partner Re and Mapfre. Additional reinsurers include some Lloyd's syndicates and Alliance Re. The net reinsurance premiums ranged from roughly 2 to 30 billion dollars in 2007. Of those premiums, forestry provides an insignificant proportion.

Overall, forestry reinsurance is fairly restricted worldwide. There are an estimated 15 to 20 forestry reinsurance underwriters worldwide that carry out risk analysis similar to ForestRe, and this estimate allows for a few firms that perhaps we don't know about. Many of these underwriters are ex-colleagues, people with whom I have worked.

In terms of how much insurance is available in the market, \$10 million per risk (forest account) is a typical limit. It is rather difficult to get \$100 or \$125 million, which are typical requests in the marketplace from the larger players investing in emerging economies, because there is not that sort of informed capacity in the market. For bigger risks, we have to find 30 or 40 insurers that may include catastrophe reinsurers from Bermuda, if the insurance is so structured that they will only pay claims following a very, very large loss (i.e. suitably improbable). While it is a very restricted market, it is a market that can be expanded if the right confidence is provided to the underwriter and the right information is provided.

Those seven forestry reinsurers are more or less in the top 10 or 14 reinsurers around the world as ranked by reinsurance premiums. Munich Re will do some forestry, but is fairly new to it. Swiss Reinsurance Co. (Swiss Re) has been in forestry for some time, since at least 2003. Hannover Re has built up their forestry portfolio over recent years. Lloyd's has been involved in forestry insurance since the early 1990s. Scor, Allianz Munich are all recent entrants. PartnerRe has been there off and on for

some years. Spanish insurer Mapfre does a significant amount of forestry insurance in Spanish-speaking territories.

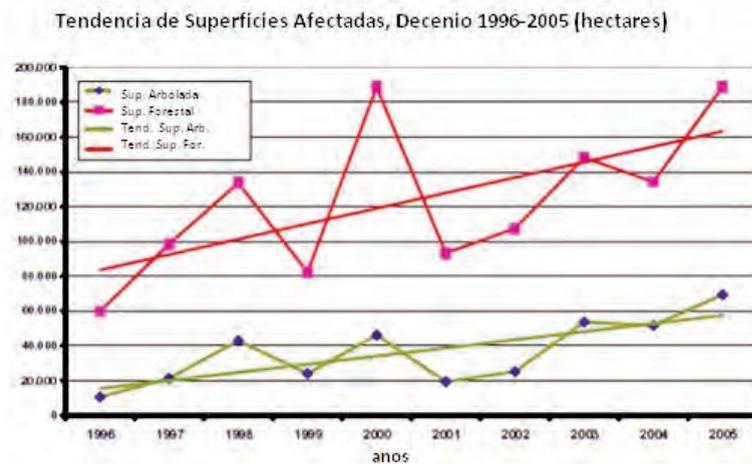
Insurance premiums for global re-insurance constitute approximately 5 percent of total global private insurance. Within global re-insurance, agriculture and forestry represent approximately 1 percent of the total. Of that slice, forestry is roughly 10 percent. So forestry is really exceptionally undeveloped as a business line.

Increasing risk

We are aware of the risks in forestry and we are in the business of giving reinsurers confidence to take on these risks. As we look at loss results from forests around the world, we see quite a striking trend. Data from the UK shows that, “What was historically [in 2000] a 10-year event (in the UK) now occurs every 2.7 years, the 20-year event occurs every 4.3 years, and the return period for a 100-year event is just 12.5 years.”¹ That is an increase of about eight times in the frequency of major events. There is an increase in temperature and an increase in the frequency of temperature anomalies. These anomalies drive events like fires, property subsidence, wind storms, hurricanes, and flooding. We try to build these trends into our pricing.

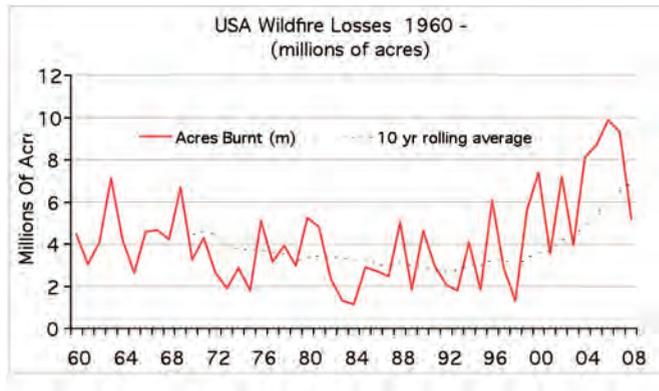
Researchers predict that a new global temperature record will be set in the next year or two. During the 2008-2009 season, we have had some once-in-a-century kind of events. The 2009 Australian bush fires saw commercial losses that exceed \$30 million. Argentina and Uruguay had their worst drought in a century. Chilean companies had the worst commercial forest fires in 20 or 30 years, with losses possibly in excess of \$50 million. California had wildfires that seem to be a continuing story, with firefighting costs now exceeding \$1 billion. While this latter example may not hit too many managed forests, it is very significant in terms of state budgets. Providing insurance for firefighting costs is something we can do on a state level.

Figure 4 Wildfire losses: 1) Spain fire losses, 1996-2006*; 2) U.S. wildfire losses, 1985-2008



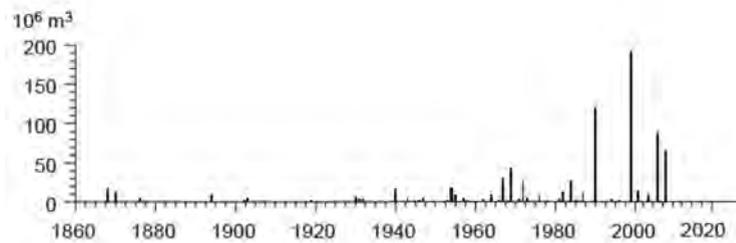
*Source: Los Incendios Forestales en Espana (Decenio 1996-2005). Version 1.2 of the study by Centro de Coordinacion de la Informacion Nacional Sobre Incendios Forestales.

¹ Dlugolecki, A. et al. 2009. Coping with Climate Change: Risks and Opportunities for Insurers. Chartered Insurance Institute, London/CII_31

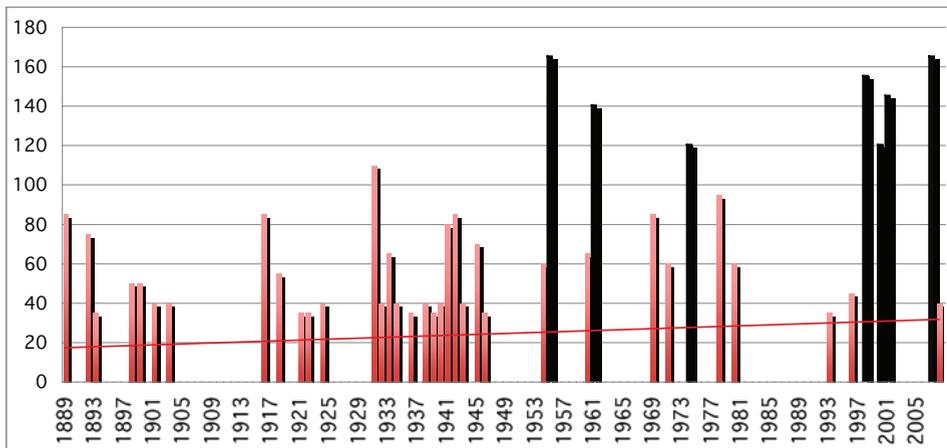


Source: ForestRe

Figure 5 Wind and forest loss: 1) Wind storm losses Germany, 1860-2008; 2) Western Caribbean landfall speeds, 1889-2008



Source: Feasibility Study on Means of Combating Forest Dieback in the European Union (December 2007). DG ENV, Study Contract No: 070102110004/2006/449050/MAR/B1 submitted by the Federal Research Centre for Forestry and Forest Products (BFH) Institute for World Forestry and the European Forest Institute (EFI).



Source: ForestRe

Figure 4 shows trends in fire and forest losses, while Figure 5 highlights trends in wind. The wind trend is similar to that of fire, perhaps just not as dramatic. For U.S. wildfire losses, a 5-year rolling average shows that 100 percent more acres were burnt on average in 2008 than 1990. The German windstorm losses are based on data gleaned from newspapers and other publications. In the projections for the Western Caribbean landfall wind speeds, the black columns represent Category 3 to Category 5 hurricanes. Four of seven of these happened in the last ten years, which again seems to be an increasing trend.

Analyzing and pricing forest enterprise risk

How do we analyze and price this risk? The first thing is data. It is a huge struggle to find the right kind of data. The most common situation is that forests are present but no data is available. We then search for it from web sites in the public domain, and/or personal data with similar forests in the proximity. We try to gather 20 or 30 years of data and then review the trends. We often dispense with longer-term historical losses, because most serious losses happened within the last ten years; we do not want historic data to dilute what is happening now.

We set the parameters and we run the models. For example, we take Oregon, run a Monte Carlo simulation of losses and end up with a table of return periods. In the case of Oregon, it has a mean annual area lost of 0.1 percent, but we also get the 1 in 100 year event (i.e. an event with 1 percent probability) resulting in just over 13 percent forest area lost per year. That appears to be a rather extraordinary statistic, but in 2003, Portugal lost 15 percent of its entire commercial eucalyptus area in one year. So, it can happen in the right circumstances. In the case of Oregon, we are dealing with a forestland fire. If we look at managed forestland, the trend might be less severe. We are now approaching various managers of forestlands in Oregon to ask them to provide data showing their performance and whether it is better than their surrounding environment.

After completing the research, we produce a mean ground-up loss cost on an area basis and then we load it. We generally use 5 percent loading, but it depends on where we are. If the data contains what is clearly a catastrophic loss such as in the Australian example above, then we do not add an additional load. Otherwise, we do load it for catastrophic events that are not represented in the data set. We give credits for things like salvage value – the amount that can be obtained through the sale of damaged timber, for instance – which reduces a loss to underwriters. Another credit would be related to any limit to our liability (i.e., there is a maximum amount that insurers would pay out that has been pre-agreed with the insured). In the case of carbon, we look at how much carbon is retained in the project after the storm or fire. Once again there are various credits and various loadings. We then adjust the whole thing for our target loss ratio, which is the target ratio of claims to the premium.

Since forestry is a catastrophic class of business, we operate at quite a challenging loss ratio. It is on the order of 40 to 55 percent. Property insurance, or something similar, might operate at 80 or 90 percent, but with smaller margins and a high volume of business. Forestry is quite the opposite, with a low volume of business. So,

we need a good margin of premium over losses to build up a premium pool and protect the capital of insurers taking on the insured risks.

In addition to the above analysis, ForestRe provides technical results and gives underwriters at Lloyd's a client profile. We also analyze current conditions like El Niño and La Niña that can indicate loss cycles. In Chile, for example, most of the losses are associated with La Niña cycles. However, we still have more to learn there. We are always looking at predictions for precipitation and temperature, as well as any preexisting conditions. For example, if there are fires near a property we are about to insure, we might not do it.

Through this research and assessment, we come to a price. It is fairly straightforward process, yet I think we are the only insurer, if I can use that general term, that has this process to determine risk price. There are many insurers that may price based only on rate on line (premium as a percentage of liability). They might look at a 1, 2 or 5 percent rate. For us, the underlying risk is something that we look at and balance with the level of returns insurers are trying to achieve.

Understanding the forestry carbon sector and insurance

At the moment, the Clean Development Mechanism (CDM) under the Kyoto Protocol only includes afforestation and reforestation for forestry. However, we are hoping that Reducing Emissions from Deforestation and Degradation (REDD) projects will also be included in the future. The general opinion is that it might not be, but it may be included in some form or other for national compliance rather than trading under the European Union Emission Trading System (EU ETS). The CDM is a pretty bureaucratic system that is very difficult to get through. There are a lot of internal discussions about methodology and how programs are being approved.

A much smaller market in terms of total carbon cost is the voluntary carbon market. Forestry is even a smaller part within that. The Voluntary Carbon Standard (VCS) is possibly the forerunner of standards for forestry projects, but there are others, such as the Climate, Community and Biodiversity Alliance (CCBA) and the standards for the upcoming World Bank Biocarbon Fund. In the United States, the Climate Action Registry has its forestry protocols. In the voluntary market, forest carbon includes afforestation and deforestation for carbon sequestration, and avoided emissions through reduced deforestation.

So, at what point can insurers get involved in this market? We have been looking at this since 1998 and, until there are standards, we really cannot take a view as to how to design the risk transfer instrument. With the appearance of the VCS standards and our understanding of the process for obtaining certified credits, we can now identify the point at which to design a carbon delivery guarantee for projects. Figure 6 shows the point we have identified: the Emissions Reduction Verification Report (Stage 5 in Table 6 below). At this stage in the process, we know what the project is going to reduce; how the reduction is going to be measured; and when the carbon certificates may be delivered. We get involved at this stage because we are no longer talking about a theoretical carbon delivery insurance guarantee, but rather something very specific. At this stage, it involves real trees, a real location, real data, real management criteria,

and so on. In other words, at this point there is something specific to work on. The provision of the insurance takes effect when the credits are actually registered.

There are several key insurance criteria for carbon. The insured interest is carbon dioxide equivalent (CO_2e) and we need to know the form of that value, how that value is being generated, and how it is calculated. We are also concerned with salvage – what remains of the carbon after a loss event? In the Climate Action Reserve (CAR) standards, there is a mechanism whereby the effect of lost or damaged carbon can be mitigated. On the design end, we can create insurance by dollar value of the carbon, but with the price volatility of carbon, (and we cannot cover price risk in this emergent market) there is a lot to be said for true indemnity by replacing carbon with carbon of the same provenance.

Figure 6 Entry point for insurers of carbon: Emissions reduction verification point



With carbon production, we need to know the answers to questions like what the carbon production profile is over years, at what rate the carbon is sequestered, and what proportion of the carbon is above ground and below ground. If there is a loss of above ground carbon, does that impact the carbon below ground? The answer is important to us. If we are replacing lost carbon, we need to know where and how it has been lost and what the standard is for measuring the loss. The biggest question is probably what proportion of the lost carbon can be regenerated. If there is a cyclone in your Caribbean forest, how many of those trees are actually dead versus how many are alive and continue to store or sequester carbon?

We also need standard information on project location and management. There should be a risk mitigation plan for the site, be it fire management or post-lost mitigation. There should also be involvement from various stakeholders. Com-

munity involvement is actually the key to a low risk environment to avoid accidental or non-accidental fires in the area.

It is a learning process. We intend to read the various verification and certification reports that a given project uses to register credits to fully understand it. At the moment, we are still in the very early days.

Market requirements

When we look at carbon insurance wish lists, the first thing that everybody wants is for everything to be covered. It is obvious, but cannot always be done. Political risk, particularly expropriation risk, is a big one. Other perils might include credit risk for

the companies involved, climactic hazards, theft, illegal logging, pests, diseases, and so on. The industry wants a one-stop shop.

In this shop they would like delivery to be covered so that if, the project should disappear in part or entirely, all the carbon can be replaced. For us, replacing carbon with carbon gets us in the whole business of price exposure. Insurers generally do not insure price unless there is very detailed information, such as what the wheat price is on the Chicago Board of Trade. Price movements can be modeled, but in terms of carbon or forestry, that sort of information is not available. Thus, if a project loses carbon, we would replace it with carbon from another project managed to the same protocol with which we have an arrangement. In addition it would be helpful if we take our premium not in dollars but in certified carbon, which should be quite attractive.

The benefits of such insurance include enabling projects to have smaller buffers. The voluntary carbon standards set the buffers according to the project specifics, looking at high risk to low risk for all the different perils that were mentioned above. The insurance raises the value of that carbon as well – not only can the buyer be sure that the carbon will always be there, but they will be willing to pay more for it. In that sense, insurance could be a self-funding exercise by enabling earlier and better cash flow and also at a higher price for carbon.

In practice, what will insurers do? Insurers are notoriously risk-averse and will approach this new sector with great caution and take only small shares of any risk at the beginning. Bearing in mind the potential size of the forest carbon market, there will be a great need for insurance capacity that will be well beyond the risk-appetite of reinsurers listed earlier. So, for new insurers, the first frustration is their general perception that you cannot insure forests. In order to persuade them to participate in forest carbon project insurance, a great deal of risk modeling work will be required. That means that, in the early years, insurers shall be limited in the range of perils they are willing to insure and, more importantly, the term (length) of the policy.

Lloyd's, for example, generally issues only one-year policies. Others, like Swiss Re and Munich Re, will do five or more years. So, for carbon, we would not use Lloyd's, but rather a continental European reinsurer as the lead. The maximum policy term then will be probably five years, and not something longer that the project proponents would like.

In terms of limited perils, we can only rate what we know about. We know about natural hazards. We could provide insurance through other insurers or niche carbon capacity that is being developed right now, for credit risk, political risk, process risk, etc. The premiums, as mentioned above, can be paid with carbon credits at pre-insured values. The project would be assessed annually to assure the price being paid is realistic for the risks being insured. For example, if one were to price a 5-year policy, due to the uncertainty of conditions five years ahead, insurers would place a larger loading factor on that premium than if the policy were written for just one year. In fact, it is a lot cheaper to price the policy annually. This means that a client would pay each year to update the schedule of delivered certified carbon that requires insurance. There are some logistical reasons why a client might not wish or might not be able to pay on an annual basis, but that would actually be the cheapest way to do it.

Insurers are notoriously risk-averse and will approach this new sector with great caution and take only small shares of any risk at the beginning.

We did a study for the Canadian government on using their own forests for compliance and we looked at a 15-year term policy. We compared the 15-year policy paid upfront with an annual payment over each of 15 years and the difference was an extraordinary multiple of premium for the upfront payment compared with the accumulated annually-paid premiums. The project was to look at fire, pests, and disease. We ended up doing just fire for the simple reasons that the pest and disease data was so complicated and rather incomplete. There are huge issues when trying to add in multiple perils on forests, so we need to start simply.

For longer time spans, considering the 100 year carbon liability as in the CAR buffer, the pricing will obviously need to take into account the one-in-100 year catastrophic event, and maybe the one-in-250 year event, bearing in mind that the frequency of such events is probably a lot higher than the numbers suggest under current climate conditions.

Insurers also need a critical mass of forestry projects to provide a sufficient buffer pool for liabilities. If I am going to insure your forest for carbon, I need another one somewhere that I can get carbon from and that other forest needs its carbon to be captured according to the same standard. Over time, the insurer will build a portfolio and be able to manage everybody's buffer.

The very first project, then, is the difficult one. From where do we get the alternative carbon? We might be able to get the replacement carbon from the project's own buffer depending on the buffer size – for example, if its buffer is 20 or 30 percent, but we are confident the risk is lower. Or, more appropriately, we might be able to take the replacement carbon from another project either in the same region or another part of the world that is accounted using the same standards. Of course, we would need to monitor the forest for disturbance and actually confirm where the losses occurred, how big they are, and so on.

If there is a big REDD project somewhere, it would be useful for us to use that as a carbon pool. To get there, however, the project would have to go through the whole certification and validation process. That is what we need to do if we are going to build up a pool of carbon around the world. And if we are to do that over a large number of years, we may find ourselves replacing carbon several times over. If there is a delivery this year to somebody and it is lost in five years' time, we can replace it. That, in turn, may be lost. We are going to need a fairly rigorous registration process to track all the carbon that we have replaced.

In a perfect world, insurers could become buffer managers that could potentially form a buffer partnership with the voluntary carbon standards or just do it on our own. It would seem logical that insurers should have a registry of carbon available in the buffers to draw on as required. In addition, we would need to have access to carbon traders or use other insurers that have their own carbon trading unit, such as Swiss Re.

Carbon product ideas

I would like to present three carbon product ideas as examples of what may work. The first one is not carbon indemnity at all, but it is insurance to maintain the project's financial sustainability following a loss. Post-loss there may be costs associated with

Insurers also need a critical mass of forestry projects to provide a sufficient buffer pool for liabilities.

replanting, debris removal, and re-verification, as well as increased costs of harvesting. The premium would be in currency in exchange for currency to maintain operations and to enable the cash flow to absorb the losses. It can be an annual policy and have normal policy insurance structures with the named perils being natural hazard and political risk. This could be a simple and conventional type of insurance to serve as an initial step. We are working on something like this right now.

A second idea that is perhaps more useful is a carbon delivery guarantee for individual projects. It suggests that we work with registries to provide a carbon delivery guarantee of a ton of CO₂e by potentially drawing from the pools in the registry. The registries would use their systems, monitoring the issuance of carbon and drawing the indemnity from the pool. Losses in excess of the pool would have been indemnified in a normal way, as already mentioned, by a third party project.

A third insurance idea that is maybe more cost effective is a carbon delivery guarantee in excess of the registry pool. In this case we leave the registry, such as CAR, to manage its own carbon indemnity from the pool, but we would insure anything in excess of that buffer pool capacity through a third party project. The advantage to carbon participants in this scenario is the price of the cover – because it is removed from the ground-up loss, it is going to be cheaper. This is a typical way of providing insurance to large projects, by splitting the risk up in layers of similar loss frequency, in this case the buffer pool absorbing all the frequent losses, and insurers taking only very infrequent losses that threaten the buffer pool integrity.

We would take the premium for this in carbon. Once a project is insured, carbon price would have an uplift of possibly two or three times because of the certainty of supply. At that point, we as an insurer might sell that carbon to generate additional income. This also potentially gives us a much greater margin to cover the uncertainties of multi-parallel, longer term policies. That is the logic behind that proposal.

CONCLUSION

I would like to offer three concluding remarks concerning insurance, risk trends, and carbon. The market for insurance is very restrictive, but we are extending the capacity in international markets to provide insurance services for forests. We are doing this through good analysis and through complete and repeatable presentation of the risks. We are trying to bring expertise to the sector to remove the fear of insuring forestry. However, as mentioned, there are requirements. The local insurance markets do not understand forestry or how to price it properly. In China, for example, a lot of forests are written at very low prices. There is actually no rhyme or reason behind the rates and they are simply too low for the risk. We are trying to demonstrate to the industry that there is insurance capacity. We need to build well-dispersed forestry portfolios to enable the insurance to be self-sustainable and not suffer from the volatility that comes from a small portfolio vulnerable to a big loss.

In terms of risk trends, there is an increasing trend for fire and wind damage. This is what we are trying to measure. Any investor going into forestry needs to be aware of what that risk profile is. If an investor does nothing else but understand that an

average loss has volatility surrounding it, then that is value in itself, notwithstanding whether the investor may or may not buy the insurance.

Lastly, we will definitely get involved in carbon. It is still at a very emergent stage, but in the last five or six months, we have had, for the first time, a similar number of inquiries for forest carbon projects that are actually set up, those that are going through the process of being set up. In other words, we have real forests in real locations with real data around which we can begin to put a risk transfer price.

The key for us is that we understand the nature of this market. How does it really work? How does it cope with losses? What are the rules and what are the standards? Regardless of the standards, we will have to work within them. If we can do this, then at least we have achieved the goal that I believe everybody has wanted: providing some element of permanence to forest carbon.

Question & Answer Session

QUESTION 1: Carbon insurance – where and what?

Thank you for your talk. I have two questions. First, in thinking about the potential market for carbon insurance products, where does it make most sense geographically to buy this kind of insurance? What areas are more exposed to risk? Perhaps the Caribbean has risk with hurricanes, drier climates have forest fires, but then perhaps the Amazon rainforest is more stable. Second, what would the carbon delivery guarantee product cover? I assume it would include natural disasters, but how about from underperformance?

Addressing the second question first, we should note that at the moment there is no carbon insurance anywhere. There have been a couple of policies in carbon by Swiss Re that have been tied up with a single company and they are not currently being replicated.

You are quite right in that the indemnity will come as a result of natural hazards, not underperformance. We do not insure management performance. We insure things like natural hazards, which have data, frequency, and severity with which we can come to grips. We cannot model underperformance. You might think that something like political risk contradicts that, but with political risk there is already a well-established market. There are well-established rates for each country. These rates are then linked with the conditions of the project. We insure natural hazards and political risk, but not management performance.

In terms of where best to do it, the secret of course is to do it as widespread as possible. Brazil is great if you are in the center of the country because all deforestation is occurring around the edges, except for the parks. There are huge areas being lost annually in Brazil, but if you have a project in the center, it is pretty safe because it is remote; that would be a great place to insure carbon. We like a good spread – we do not want all fire risk or all wind risk and we want geographical diversity.

QUESTION 2: Mixed species stands and the role of management plans

I also have two questions. Would you charge lower premiums to insure a forest or plantation that has mixed species? I ask because we are told that a mixed species stand is more resilient, being less prone to disease attack and possibly even wind disturbance and other things of that nature.

Also, in answering the last question you made a comment that you do not insure management. Do you require a management plan to be followed? You could easily have a forest that someone does not manage properly, greatly increasing its risk to fire. For example, if management does not thin a forest properly, that is going to greatly increase the risk of fire. So I wonder if, to some degree, you are insuring management or requiring a very specific management plan to be followed.

Again I will start with the second question first. We do not insure management performance, but you are quite right. A management plan is absolutely essential and for every carbon project, there is a management plan provided. For example, we are insuring schemes in Spain and Portugal and each one has a management plan that has been approved by the government for tax breaks and other things. As another example, we have just had an inquiry from California, which has taken big hits from fire. We have discovered that they do not have any resources to fight fires, so if we were to provide insurance, we would insist that they have a fire management plan. We distinguish between the plan – what should be done – and how managers actually carry out the plan. We do not insure the failure of managers to do the latter.

In terms of mixed species, we take data from the particular region. In some parts of the world there are natural mixed species stands, and that is what the data relates to. We approach the issue in this way. If you are going to enhance forestry with other species, then sure, this is a factor. It is rather similar to a forest where there have been terrible losses, but now with new owners and a new management plan. What do we rate it on? We rate it on what has happened under the old owners. We do not have any data for the new owners, but we would recognize the forest as better risk. We will try and get some credit for that, and it is better if these people have a track record somewhere else so that we can show before and after.

In due course, we are assembling the data. We have a loss data compendium and everything goes in there. In a number of years and with enough business, we might have enough data to possibly do rating by post (zip) code globally but that is some years off. Rating should operate on a standard actuarial basis and not as it does at the moment, which is a blending of actuarial basis and experts. Forests should be able to be insured like cars – a rating matrix by location, species and age mix, value, management standards, etc. There are thousands and thousands of underwriters of cars. For forests, there are twenty. That is where we are headed.

Insurers are not invested directly in forests like banks or institutions, but they do put their capital at risk. The difference between a bank and an insurer is that, if the bank puts a dollar in and it all burns, the bank lost a dollar. If the insurer receives a dollar in premium and it all burns, the insurer will lose a multiple of that, may be \$100 or \$200. As a result, insurers potentially have the greatest interest of all

institutions in managing forests. There are huge problems and insurers could monitor conditions via satellite technology. They could talk to owners and warn them of impending storms or fires. This is actually not too far fetched.

At the moment, forestry insurance is a microscopic sector, but it does not need to be; it should grow. Forests are our natural infrastructure. They are not just timber. They are water, biodiversity, and raw livelihoods. There is such a political drive around forestry now that maybe its time has come. At last insurers may start listening to foresters and provide the risk transfer services required.

QUESTION 3: Financial instruments for carbon price risk

My question is a follow up to the last one. In your response you mentioned that being an insurance company is very different from being a bank in the sense that, instead of losing one dollar, the insurance company may lose hundreds. Can you talk a little bit about this from the carbon perspective? If someone is not able to deliver on their carbon contract, then you would need to either pull carbon from another project within your portfolio or you would have to draw from the market. Given the volatility around carbon prices, is there any concern about the price risks, and is there any movement toward hedging those risks by entering into derivative contracts or looking at futures and forwards?

In the long term, you get a liquid market and you can surely employ these hedging mechanisms. At the moment, however, I am not sure if these options are available. I would say that in forestry insurance we indemnify carbon and the biggest risk for an insurer, as we discussed earlier, is the very first thing he insures. So, in terms of carbon, for the very first project, we should be careful and make sure that the pool is well in excess of our calculated exposure for the 100-year event. In other words, we want to have a multiple of carbon available to provide the indemnity.

Based on this line of reasoning, I think the very first project is really self-collateralized. The carbon that is to be delivered is backed up many times by the pool. What we would do is simply say, “Yes, it is insured,” and we’d take it from there. If you have 100 projects, then you can manage to reduce the buffer until it is 5 percent globally, or maybe 1 percent. Probably that’s going a bit too far, but I can sort of imagine that a buffer of 5 percent amongst political risk and natural hazard risks for the decent portfolio is likely adequate. However, for the moment, you have to be very, very cautious.

QUESTION 4: Assessment of management plans

What kind of science is available that you would actually use to calculate a risk, for example practices of sustainable forest management to avoid fire damage or pest? Do you have a standard that is developing? What sort of expertise is involved in assessing a management plan and its potential impact on the risk?

One of the things about sustainable forest management certification is that they have actually thought about risk. In our experience, that in itself has a huge impact on how exposed and responsive a forest is to its environment. We look at a plan to see if it includes risk, how it might address risk, and determine if the plan appears to be

appropriate. It is a judgment call. We do not have an absolute standard by which to check boxes. A given project may look fine but the best plans can be poorly run.

That does not precisely answer your question, but if the risks have been thought about and identified, then chances are the losses from those risks can be avoided. A classic example is from a South African commercial plantation that suffered fire losses. After an audit of the losses and the plantation, it was noted that the workers were getting up at 4:00 am, having their breakfast, going off into the forest, and then cooking their own lunches. And, lo and behold, the fires started about lunchtime. Management started providing lunches to the workers in the forest and the fires dropped. This is a very simple example of identifying the cause of loss and addressing it.

For insurers, the primary question is: Has the loss occurred? Of course, we could be told anything. But now we have tools that we did not have perhaps ten years ago. The progress in satellite monitoring of forests is advancing by leaps and bounds. We work indirectly with an outfit based in Switzerland that specializes in satellite earth observation data. They have done a lot of work on crop yields in Africa and Brazil, and they have also monitored forestry and standing volumes. It is getting to the stage where it is more accurate to measure standing volumes of a single species by satellite than it is to do it on the ground.

This means that we can monitor carbon stocks by satellite. Moreover, we can monitor zillions of hectares very cheaply. The analysis of these images is more or less automated now. So when there is a reported loss, we can confirm if and where it has happened, the size, and the volume of carbon lost. It is fantastic.

In terms of reduced or avoided deforestation, the ability to eventually monitor individual trees is in development. I could show you a picture where satellite images have identified missing trees and overlaid a forest plantation. They are pretty good. The tools for us are fantastic and improving. They could be insurer's big brother in terms of controlling risk.

Fast Company: Yale Idealists Slowing Global Warming through Forest Investment

Michael Coren

Consultant, Climate Focus

A specialist in carbon markets and forestry, Michael Coren has experience in voluntary and compliance market standards, and in financial and carbon modeling in tropical forests. He has worked for the World Bank in Indonesia on the design of avoided deforestation policy and managed feasibility studies of forest carbon and ecosystem service projects in Southeast Asia. Mr. Coren studied economics and received a Master of Environmental Science from the Yale School of Forestry & Environmental Studies.

Marc Hiller

Associate, International Forestry Investment Advisors

Marc Hiller develops private equity timberland investments with International Forestry Investment Advisors and New Forests Asset Management and also has worked as a forester with institutional investors, wood-product manufacturers and retailers, and forest managers. He previously led Tropical Forest Trust's Indochina program, helping manufacturers and retailers source sustainable timber and advising forestry companies on best management practices. He holds an M.B.A. from the Yale School of Management and a Master of Forestry from the Yale School of Forestry & Environmental Studies.

Jason Patrick

Vice President, Carbon Markets, Bank of America Merrill Lynch

Jason Patrick oversees the investment bank's carbon business in the Americas and is responsible for the origination, structuring and commercialization of principal carbon products. Mr. Patrick previously worked at Evolution Markets Inc. and the Environmental Defense Fund. He holds an M.A. in Financial Economics from New York University, a Master of Environmental Management from the Yale School of Forestry & Environmental Studies, and a B.S. in Natural Science from U.C. Berkeley.

Mark Wishnie

Managing Director, Equator, LLC

Mark Wishnie oversees the development and management of Equator's timberland businesses, including due diligence of investment opportunities and coordination of timberland acquisition and management services. He previously served as Program Director of the Yale Tropical Resources Institute, Director of the Smithsonian Tropical Research Institute's Native Species Reforestation Project, and as a silviculture and restoration consultant. Mr. Wishnie holds a B.S. in Forestry from the University of Washington and a Master of Forest Science from the Yale School of Forestry & Environmental Studies.

April 29, 2009

5:00 to 7:30 p.m.

Burke Auditorium, Kroon Hall

195 Prospect Street

Chapter 11

Fast Company: Yale Idealists Slowing Global Warming through Forest Investment

*Bryan Garcia, Yale MEM '00 (Moderator)
Program Director, Yale Center for Business and the Environment*

*Michael Coren, Yale MESC '09
Consultant, Climate Focus**

*Marc Hiller, Yale MF/MBA '07
Associate, International Forestry Investment Advisors***

*Jason Patrick, Yale MEM '00
Vice President, Carbon Markets, Bank of America Merrill Lynch****

*Mark Wishnie, Yale MFS '01
Managing Director, Equator LLC*****

This chapter is a discussion that highlights the experience and perspective of four graduates of the Yale School of Forestry & Environmental Studies. Through the course of the discussion, they share information on their career paths and the work they and their companies do. They also offer perspective on a range of pertinent issues, from the impact of the financial crisis to ways to better engage forests in greenhouse gas mitigation, and from forest and carbon management to issues of land ownership.

INTRODUCTION

Bryan Garcia

Last summer Anya Kamenetz from Fast Company wrote an article titled “Can Carbon Credits Slow Global Warming?”¹ In that article she highlighted the emergence of the

* For more information on Climate Focus, please go to www.climatefocus.com

** For more information on International Forestry Investment Advisors, LLC, please go to www.ifiallc.com

*** For more information on Bank of America Merrill Lynch, please go to www.bankofamerica.com

**** For more information on Equator, LLC, please go to www.equatorllc.com

¹ <http://www.fastcompany.com/magazine/127/carbon-boom.html?page=0%2C1>

carbon offset market and the army of young Yale graduates who are at the forefront of this movement. Several of the alumni referenced in that article are here with us this evening. It is this network of Yale alumni, Anya states, that is exerting tremendous influence over the brand new market of greenhouse gas credits, which last year reached an estimated value of \$1 trillion in the U.S. alone.

In Anya's article, Radha Kuppalli, a joint-degree graduate of the Yale School of Forestry & Environmental Studies (FES) and Yale School of Management (SOM), stated that when she goes to carbon conferences, "If eight names are mentioned... six of them are joint degrees or FES [alumni]." Her comment highlights the strong presence of Yale alumni in creating carbon markets. Tonight we will hear from four of these professionals who are investing in forests throughout the world and helping to advance global carbon and other ecosystem service markets.

It gives me great pleasure to introduce our panel for this evening. First we have Marc Hiller, who is a recent graduate of the joint degree program, class of 2007. Marc is an Associate at International Forestry Investment Advisors. He is responsible for developing discounted cash flow models and conducting economic analyses for long term forestry investments in the United States and emerging markets.

Next is Mark Wishnie, who graduated from FES in the class of 2001. Mark is Managing Director of Equator LLC. He oversees the development and management of the company's timberland businesses in Latin America, including the technical review and due diligence of investment opportunities and the coordination of Equator's timberland acquisition and management services.

Our third panelist is Michael Coren, who will be graduating from FES in May 2009. Michael is a consultant with Climate Focus. He is a specialist in carbon markets in forestry and has experience in applying voluntary and compliance market standards and financial and carbon modeling to tropical forests.

Finally, we have Jason Patrick, who graduated in 2000 from FES. Jason is a Vice President at Bank of America Merrill Lynch. He is responsible for the bank's carbon business in the Americas, where he originates, structures, and commercializes carbon for Bank of America's commodity businesses and its clients.

COMPANIES AND PANELIST ROLES

Bryan Garcia

We will start this conversation by having the panelists introduce the organizations in which they currently work, as well as their roles within those respective organizations and the career paths they took.

Marc Hiller, International Forestry Investment Advisors, LLC

I work with a private equity firm called International Forestry Investment Advisors. We raise funds from institutional investors to acquire and manage forestry companies and forestry assets on behalf of our limited partners.

Our firm is not a traditional Timber Investment Management Organization (TIMO) because we focus on a few aspects of forestry in which I think traditional TIMOs have underinvested over the past few years. All of our funds have a focus on technology in the forestry sector, and on the silviculture that relates to that technology. We focus our investments mostly in capital-constrained markets or emerging markets, and all of our funds aim to have our forests certified by the Forest Stewardship Council (FSC). Our investments are very different from those made in U.S. timberland in the Southeast or Pacific Northwest.

The firm currently manages two investment funds. One is a U.S.-based fund managing 17,000 hectares of hybrid poplar plantations in Oregon. Poplar has traditionally been used for the pulp and paper industry; we acquired a pulplog estate and converting the stands to saw log regime. We have also established a major manufacturing center and invested heavily in irrigation systems. I believe our investment in Oregon is the world's largest permanent drip irrigation farm. Investments like this one are quite unique in the forestry sector.

We also run a fund that focuses on investments in emerging markets. Through this fund, we manage natural forests, plantations, and related manufacturing facilities. Our assets are in Latin America, Asia, and Africa. We are currently managing five companies. Our goal is for all of our assets to achieve FSC certification. Two of our companies are already certified, and the other three are in the process of receiving certification.

The majority of our business relates to setting up investment funds, doing the acquisition work, and then managing the portfolio companies. We also do some advisory work for for-profit and nonprofit organizations, but primarily, we are a traditional private equity firm.

Mark Wishnie, Equator, LLC

Equator LLC grew out of a trading firm in New York called Chatham Energy Partners, which was, until it was sold to Intercontinental Exchange, one of the largest over-the-counter energy derivatives brokers in the United States. Some of the traders at Chatham became interested in emerging environmental markets like carbon, and as a result became interested in forests.

Our firm today has two principal business lines. On the environmental side, we are an investment manager. We have a \$100 million fund that we co-manage with a firm called New Forests, headed by Yale alumna Radha Kuppalli who was mentioned earlier. This fund receives capital from institutional investors, and invests in regulated and unregulated markets for carbon offsets and environmental mitigation. Work in the latter category principally involves wetlands mitigation, with some endangered species mitigation as well. The investments focus principally on the U.S. regulated markets for mitigation and on unregulated markets for carbon. We also have some international investments.

The other side of our business is asset management for timberlands. We provide a variety of origination, acquisition, and ongoing management services in Latin America for TIMOs and for U.S.- and European-based investment managers looking

for opportunities to get Latin American timberland investment exposure. We have about \$280 million in capital commitments on the timberland side, and about 40,000 hectares under management in Brazil. I am principally responsible for this side (timberland management) of Equator's business.

Michael Coren, Climate Focus

Climate Focus is a consultancy based in Rotterdam, with additional offices in Washington, DC, Sao Paulo, Lisbon, China, and Brussels. It started about five years ago, drawing business from the policy and legal work in carbon markets forming under the World Bank and the United Nations Framework Convention on Climate Change (UNFCCC). Over time, Climate Focus developed into a legal, technical and policy advisory services organization.

The U.S. office, where I work, focuses on forestry. We are currently in the process of helping to develop technical standards for the Voluntary Carbon Standard for Reduced Emissions from Deforestation and Degradation (REDD). Avoided deforestation could be a major component of the next climate regime. One of the missing pieces is the credible standard needed to make that into a market. We are trying to avoid the mistakes of the Kyoto Protocol's Clean Development Mechanism by creating a system that is more modular and at the same time transparent and credible.

We also act as technical advisors on the projects themselves. For example, we advise individual projects in places like Southeast Asia and Brazil on conforming to international compliance or voluntary standards. Through that, we attempt to expand the market for forest carbon.

Jason Patrick, Bank of America Merrill Lynch

At its core, our business is a proprietary trading desk that buys, structures, and sells carbon allowances and offsets. We are major traders in the main carbon market, the European Union Emissions Trading Scheme. We are also actively engaged in buying, structuring, and selling primary and secondary Certified Emission Reduction credits (CERs) and Emission Reduction Units (ERUs). I focus most of my time on originating and structuring U.S.-based offsets, since we see that as a key opportunity moving forward in the U.S. markets. Because of the nature of carbon – a policy-driven product that attracts significant media attention – I am also responsible for internal and external engagement regarding our activities in the carbon space.

In addition to proprietary trading, we also focus on market activity, such as principal investment. That work has increased since our integration with Bank of America. We also occasionally work with the Global Wealth Management side of Bank of America Merrill Lynch, which is a huge business, to formulate bespoke products for specific investor needs. As the U.S. market develops, we expect to create retail products that would go out through these wealth management channels. We also liaise with other parts of the bank in our work on proprietary trading and principal investment.

PANELIST CAREER PATHS

Bryan Garcia

Since this is to a certain extent a career panel, can each of you talk about how you ended up where you are? What was your career path? What were some of the courses you took to prepare for where you are today?

Jason Patrick

Following my graduation from Yale FES in 2000, I worked for some years with the Environmental Defense Fund analyzing environmental markets. At the time, I was also going through another degree program in financial economics, and was focusing my study on commodity modeling, in particular on carbon. When some of the markets that I was focusing on took off with the ratification of the Kyoto Protocol and the implementation of the Emissions Trading Scheme (ETS) in Europe, I moved from the NGO and academic side to the private transactional side. I worked in brokerage for some years doing mainly U.S. and international offset deals before being hired to take responsibility for the proprietary trading desk at Bank of America Merrill Lynch.

Marc Hiller

I have spent most of the past ten years working as a forester. In 1998 when I graduated from college, I moved to Indonesia and worked as a field forester for several years for a community forestry and development project. I then found a great job with the Rainforest Alliance's Smart Wood program as an auditor of forest management and chain of custody. Ultimately, I turned into a consultant, advising businesses on how to comply with the FSC standards. I did that for six years in South and East Asia, primarily in Indonesia, Malaysia, Vietnam, and China. I then came back to FES and SOM and completed two degrees in three years – the MBA and the Master of Forestry (MF) – focusing my coursework on finance and forestry.

As a student, I had an internship with HSBC, advising the bank on implementation strategies relating to the Equator Principle commitments that the bank had made to consider the social and environmental impacts of its loans. I also spent a summer working for New Forest, a private equity firm that invests in emerging market forestry deals, as discussed earlier. While I was a student I also worked with my current firm, and have now been with the company for two years.

Mark Wishnie

I came to FES a year after I had finished my undergraduate program in forestry. At the time, I planned to do the joint degree with the School of Management. However, after my first year at the FES, I was offered an opportunity by Mark Ashton to work with him, as well as Brad Gentry and several others, to develop a research program for the Smithsonian Tropical Research Institute in Panama focused on plantation forestry with native species. I thought, "Well, I can always come back and do the MBA

later.” I left, originally planning to be in Panama for six months, and came back six years later.

I had a great experience in Panama working on a number of research programs focused on plantation forestry, all looking at how to make environmentally and socially sustainable forest practices economically and operationally viable. After six years of doing research, I found that what had been most interesting to me was the work that we did with private companies and with the people who were trying to put these ideas into practice. I therefore decided to return to the United States and move into management, as I had originally planned. I began doing some consulting when I moved back to the U.S. in mid-2006, and then Brad Gentry made an introduction for me to a group in New York that was starting to look at these issues. That group became Equator. Yale FES has thus played an integral role in my professional development from start to finish.

Michael Coren

In some ways I followed the footsteps of Marc Hiller. We both went to Emory University and then to Indonesia. I did my undergraduate degree in environmental science and journalism, and pursued that for several years. I often focused on the forestry sector in Cambodia, and later in Indonesia. I came to Yale to strengthen my expertise in environmental economics. Mark Ashton’s and Brad Gentry’s courses were very useful, as were competitive strategy and some of the courses at Yale School of Management.

My first summer in graduate school, I was interested in working in environmental commodity markets, and so started at a firm that was working in retail electricity and carbon offsets. Toward the end of that summer I pursued some research in Indonesia under my advisor, Lisa Curran. While I was there in 2007, I started working with the World Bank and designing policies for the implementation of REDD in Indonesia. The process was to evaluate the different forestry and land use sectors in Indonesia, and then prepare the country for an announcement at the United Nations Climate Change Conference in Bali to propose a climate regime that included avoided deforestation.

I was in Indonesia for a year. While I was in Indonesia, I read an article called “Snake Oil for the Mind: National Baselines for Reducing Deforestation”² that challenged conventional thinking about climate change and markets, such as the idea that baselines would take care of leakage. Since coming back, I have been working on environmental economics. I later applied to work at the organization that published that article, Climate Focus. I now work with them in Washington, DC on those issues.

² http://ecosystemmarketplace.com/pages/article.opinion.php?component_id=5582&component_version_id=8054&language_id=12

IMPACT OF THE FINANCIAL CRISIS ON FOREST INVESTMENTS

Bryan Garcia

One of the issues we have heard about throughout the course of this speaker series has been the impact of the financial crisis. How does the current situation impact what your

organizations are trying to do in terms of investing in forests, or in helping to originate deals and get carbon markets up and running? How has it impacted the way you operate and the way you make your investments?

Jason Patrick

There has been such upheaval in the banking industry. Beyond that, however, I think that the carbon finance industry has been tremendously affected on a number of levels.

First, the products we follow, for example European Union Allowances (EUAs) and secondary CERs, are traded in the liquid market. Therefore, the prices of those products tend to be directly correlated with other energy commodities. That means that not only the trading products, but also the primary projects that generate the offsets, are tremendously affected by any change in the market. As the market fell, those projects tended to have fewer interested buyers and investors, and saw investors requiring projects to meet higher hurdles to receive capital. There was a period from around November to February, I believe, when not a single project was done in the CER market. This was remarkable considering the explosion of activity in that area from 2005 up to that point.

A second obvious example is that there were entire desks in some banks and financial operations that shut down due to changes in risk control at those institutions. Credit Suisse, Swiss Re, UBS, and others have all exited the carbon space. Along those lines, I would argue at a more subtle level that the crisis has changed the way we do our business, since risk controls have now changed and will continue to be different for some time. Where before we were given much more leeway as to what kinds of counterparties we would trade with and what kinds of risk limits we could take, that flexibility has now been scaled back.

Michael Coren

Climate Focus straddles the private and public sector to some degree. As a result, we have not yet seen that steep drop in private sector projects. We have several projects in the pipeline that have not pulled out. There has, however, been a shift toward more public sector work around the upcoming Copenhagen negotiations and around building the foundations for the next market.

I think there is a general retreat in new projects. However, there is also a baseline amount of work that is continuing, and laying the foundation for when the economy has recovered or when there is at least more money flowing into either the voluntary or the compliance market. For the moment, we are seeing a shift toward public sector work, but with an eye toward building the private market.

Mark Wishnie

I would echo a lot of what Jason described. The effects of the crisis on our businesses have been significant, though in different ways. On the carbon side, we have certainly seen some of the natural buyers or natural competition to our fund retreat, as banks have retrenched or limited desks or reduced their activity.

First, the products we follow, for example European Union Allowances (EUAs) and secondary CERs, are traded in the liquid market. Therefore, the prices of those products tend to be directly correlated with other energy commodities. That means that not only the trading products, but also the primary projects that generate the offsets, are tremendously affected by any change in the market. As the market fell, those projects tended to have fewer interested buyers and investors, and saw investors requiring projects to meet higher hurdles to receive capital.

Both in our role as investors with our environmental markets fund and as a service provider to investors on the timberland side, investor hurdle rates have certainly increased, and risk appetite has decreased.

I think particularly in the timberland space there was tremendous liquidity in 2007 and 2008. Huge volumes of investor dollars were being committed to new timber funds and to increased mandates with existing managers. This has decreased significantly. There is still new money coming into timberland investments, and in some limited cases we have seen investors increase allocations to timberlands because land and trees and real assets are perceived by some to be a safe haven. Therefore, there has been some growth. Overall, however, I would say there has been a decrease in total funding.

Our investments in mitigation banks are essentially real estate derivatives because demand for mitigation banking offsets is driven by commercial and residential development. We think there is still demand and potential for growth in this area, particularly around mitigation banks that conserve infrastructure development projects. We certainly see some distressed assets available on the market. If you are an investor with capital, there is less competition across the board now for almost every kind of transaction. There are some scattered opportunities.

Marc Hiller

I will address first how the current crisis is impacting our businesses, and then how it is impacting our investors.

In terms of our businesses, when you look at the academic research on forestry investment, there is a theory that says that forestry investments do not suffer the risk of price volatility the way that other investments do. If you grow a corn crop, at the end of the season you harvest the crop, and if prices are bad you are forced to sell to down markets. With forests, in contrast, the theory suggests that if you are ready to harvest your trees and the markets are down, you let them grow until markets improve and thus do not suffer the down markets. However, I would say that while the asset prices for forestry have done better than other hard assets, we have still seen a decline in forestry prices.

We have also suffered all of the credit problems that any company has in the current market. We were having a hard time getting short-term working capital – loans from banks to pay our employees or our creditors – that normally are available at a very low rate. Another interesting problem is that the banking sector's lack of liquidity has impacted healthy businesses' ability to trade. Generally, if you have a willing buyer and a willing seller and the willing buyer has funds, you can make a transaction. There is a step in between where banks issue letters of credit, which guarantee the payment from the seller to the buyer. Generally this is a great business for banks. They make thousands of dollars and do not put any money at risk. However, this year Chinese and Vietnamese banks, where we do a lot of business, have stopped issuing letters of credit on behalf of buyers, despite the fact that buyers have more than enough money to pay for the goods and services. As a result, we have developed large stocks of logs because we cannot get letters of credit issued between the two parties.

I would argue at a more subtle level that the crisis has changed the way we do our business, since risk controls have now changed and will continue to be different for some time. Where before we were given much more leeway as to what kinds of counterparties we would trade with and what kinds of risk limits we could take, that flexibility has now been scaled back.

In terms of our businesses globally in the forestry sector, there has been a decrease in housing starts in the United States in the past three or four years. This has greatly impacted the prices of construction timber, and means that our business in Oregon, which focuses on this market, is having a hard time with the downturn.

For our investors, there are a few different issues. Mark mentioned increasing discount rates, which means that investors are demanding higher returns in order to induce their investment. I think an interesting story can relate why that is occurring.

If you look at the big institutions who are the primary forestry investors, they have allocation policies that determine how to spread funds across several different types of investments: stocks, bonds, cash, and hard assets like forestry or commodities. They might only review these allocation policies once every couple of years. Thus, if they say, “We will put 30 percent of our money in stocks, 20 percent in bonds, 20 percent in real assets and the rest in cash,” and if the price or the value of the stock portfolio and the bond portfolio declines by half in a matter of months, they become over allocated in the timber space, even though the value of timber has not changed. If over allocated, institutions may need to sell its timber assets or defer new investments. That makes it very difficult for private equity firms like ours to raise new funds.

GREENHOUSE GAS MITIGATION AT COPENHAGEN

Bryan Garcia

As investors in this market, what would you focus on if you were advising negotiators in Copenhagen on how to engage forests in providing opportunities for greenhouse gas mitigation? What would you like to see come out of an agreement in Copenhagen?

Michael Coren

I think one of the issues is that investors will not put money into forest carbon projects if the liability rests with the country and not with the project. If you have, for example, a national baseline, and the country fails to meet it, then that project would also lose out, despite having followed the rules, whatever those might be.

However, from the perspective of the U.S. Department of State, a national baseline is attractive because it allows a country to do full accounting, and in theory, to prevent cheating or at least to reduce leakage (i.e. stop avoided deforestation in one place from simply causing deforestation somewhere else). We thus need a system where investment and good practice – i.e. avoided deforestation – are connected.

One way to achieve this would be a phased approach involving some national projects or offsets that work toward the ideal of national accounting, as with REDD. That will probably not happen for the next two to three years at the earliest. The Waxman-Markey Bill that came out recently starts to touch on it, but there is a long way to go.

Marc Hiller

Along those lines, I think what investors want is what you would expect: certainty as to what the rules are and what counts as mitigation. For those of us who care about

There is still new money coming into timberland investments, and in some limited cases we have seen investors increase allocations to timberlands because land and trees and real assets are perceived by some to be a safe haven. Therefore, there has been some growth. Overall, however, I would say there has been a decrease in total funding.

forests and about mitigating climate change, I think the movement toward the inclusion of forest projects in greenhouse gas mitigation under the CDM is very positive. The expectation that these projects will be part of carbon compliance programs in the future is the reason firms like ours have begun to establish new environmental investment products.

I think what investors want is what you would expect: certainty as to what the rules are and what counts as mitigation. For those of us who care about forests and about mitigating climate change, I think the movement toward the inclusion of forest projects in greenhouse gas mitigation under the CDM is very positive. The expectation that these projects will be part of carbon compliance programs in the future is the reason firms like ours have begun to establish new environmental investment products.

So the answer we all seek is certainty. How will these credits be defined, and what will be the standards by which we judge them in terms of baselines, methodology, monitoring, and verification? Where will they count? What kinds of linkages will develop between markets to provide liquidity? These are all standard questions you would expect from an investment point of view.

Jason Patrick

To add to Marc's point, I think that any kind of international rules or markets that can be linked to U.S. rules and markets would certainly increase liquidity and increase investment in the space.

From a credit or offset management perspective, having some degree of bankability of offsets would also support investment. This bankability might involve rules allowing offsets to be created in one year but then carried forward and traded in future years, and some ability for projects or for owners or issuers of credits to buy themselves out in a kind of financial exit from long-term obligations.

Currently, in a typical forest-based offset project in California, you need to commit to maintaining a particular management regime for 100 years or more. There are very few landowners who can look at that kind of time horizon. However, if there were an ability to make a commitment for 100 years with a way to exit from that commitment at some interim point if conditions changed, even with some kind of penalty, that flexibility would allow more people to get involved in offset creation.

There are some tools that are currently being talked about at the U.S. level that would greatly facilitate the flexibility needed to use forests as offset sources.

Michael Coren

I want to add a brief note on additionality. If you were going to make an investment regardless of the revenues from carbon credits, then you should not get paid for those credits. This should hold true even in voluntary and CDM markets. If that standard is upheld, then having any type of uncertainty means that it is almost impossible to implement the program, because as investors we do not know what the rules are going to be, and so cannot invest. Given this additionality constraint, certainty is an absolute requirement for investing in any type of forestry project.

Another interesting problem is that the banking sector's lack of liquidity has impacted healthy businesses' ability to trade.

Generally, if you have a willing buyer and a willing seller and the willing buyer has funds, you can make a transaction. There is a step in between where banks issue letters of credit, which guarantee the payment from the seller to the buyer.

Generally this is a great business for banks. They make thousands of dollars and do not put any money at risk.

The problem with the CDM is that the rules and the credits are temporary. Many elements are ad hoc because of the way the program was set up, and there is an executive board under the United Nations. These elements have scared off almost all potential investors. There have only been three projects approved, and those have all been approved just in the last year. The closer we get to standardization, or at least to the point where the risks that remain are quantifiable or can be dealt with, the more investment you will see, depending on long-term demand.

FUTURE MARKETS

Bryan Garcia

If Anya Kamenetz from Fast Company were writing a story ten years from now on Yale graduates doing something to create a market, what kind of market would they be creating?

Marc Hiller

Water. I think rationalization of water use will likely be the next big new market.

Jason Patrick

I agree, though at the same time I hope it is not. In a traded water market, unlike with CO₂ emissions, there is such a thing as a hot spot, or in water's case a drought spot. A traded water market that is well implemented could be a very good thing, but one that is implemented badly could be a very bad thing.

However, I personally believe that carbon and other ecosystem services markets will continue to grow. I think that they have been proven to be the most effective means of meeting environmental goals. The canonical example is the SO₂ program under Title IV of the Clean Air Act. As carbon markets develop, I believe they will be the tool to help us reduce CO₂ and other greenhouse gas emissions.

It is important to remember that these markets are a critical part of the toolbox, but not the only solution. How much of our reductions will come from the allowance trading market and from the primary market in offset projects remains to be seen, but I do think that it will be an important part of greenhouse gas emissions control.

Bryan Garcia

I keep hearing about these biodiversity markets. How do they work?

Mark Wishnie

In the United States there are small regulated markets for biodiversity under the Endangered Species Act. There are limited markets today for endangered species habitat and restoration offset credit sales, allowing developers that negatively impact the habitat of a specific species to pay a habitat banker to restore some multiple of the area that they are affecting. Those markets are pretty small. There are also some low volume voluntary markets that are developing with similar terms, the idea being that

I think what investors want is what you would expect: certainty as to what the rules are and what counts as mitigation. For those of us who care about forests and about mitigating climate change, I think the movement toward the inclusion of forest projects in greenhouse gas mitigation under the CDM is very positive. The expectation that these projects will be part of carbon compliance programs in the future is the reason firms like ours have begun to establish new environmental investment products.

they are habitat- or species-specific. There have also been some efforts to develop some kind of more generalized biodiversity credit. Climate Focus has actually done some work on that. It is difficult to develop a generalized biodiversity offset since biodiversity is not a constant, and is very difficult to measure and describe. I think that biodiversity enters into markets today because people interested in carbon offsets from forests are also interested in the biodiversity benefits of those forests. Concerns about biodiversity do guide economic decisions to some extent, but as a separate market, I think biodiversity offsets is perhaps the farthest off. I do think that water is going to be an increasingly important market.

The problem with the CDM is that the rules and the credits are temporary. Many elements are ad hoc because of the way the program was set up, and there is an executive board under the United Nations. These elements have scared off almost all potential investors. There have only been three projects approved, and those have all been approved just in the last year. The closer we get to standardization, or at least to the point where the risks that remain are quantifiable or can be dealt with, the more investment you will see, depending on long-term demand.

Marc Hiller

I think that energy, particularly as it affects land use, is going to be important again in ten years' time, similar to how the spurt in oil prices in 2007 and 2008 led to a very short-lived boom in biofuels. The impact of that short boom in places that have land potentially available for biofuel production was dramatic. That lasted perhaps 9 or 12 months. If in ten years energy prices are high again, and there are more people and more economic activity, I think the market or market-driven environmental issues around energy, particularly biofuels, and the overall impact of those activities on the landscape will be very important.

Jason Patrick

To follow up on that, it is interesting to note how California dealt with that issue when they issued their fuel standard last week, which very much addressed the fact that the demand for ethanol has tremendous effects on food markets and land use. There is now a lot of grumbling from the ethanol and other biofuel industries about how the Californians set up their transportation fuel standard, which effectively demands that there is a full lifecycle analysis of the impacts from that fuel. There has been some great work done by Tim Searchinger of my former firm, Environmental Defense Fund, on how the impacts of the production of ethanol and other biofuels from the land point of view can actually be quite significant.

Question & Answer Session

QUESTION 1: Entrepreneurial leaps of faith

Each of you over the course of your careers has made a number of entrepreneurial leaps of faith – “I’m really interested in forests,” or “I really believe carbon markets are going to happen.” Could you talk about how you made those decisions and what you learned from that process?

Michael Coren

Columbia Business School did a study on entrepreneurs to identify what was the greatest indicator of success. The answer was failure – multiple failures. I think failure

would be a great way to start in school, because no one has to know – or if they do, you can write it off. That allows you the freedom to try and fail.

I did some entrepreneurial work while I was in Indonesia, and it was a great learning experience. It teaches you very quickly some of the skills you might need, but also the challenges and the barriers in the industry.

One thing you learn quickly – at least I did – is that having a mentor in a small firm allows you to learn very quickly from that person. Working for yourself does not always provide that unless you find it in a partner or someone else that can serve in that role. I would highly recommend finding a mentor, either formally or informally, whether or not you are on your own or in a large or a small group.

Jason Patrick

In my case, I have done nothing but focus on environmental markets from various points of view. Having spent some years focusing on how environmental markets are set up, valued, implemented, and function, I saw what would clearly be the biggest one of them all – carbon. I thought, “This is obviously for me.”

It was not a conscious decision. I personally feel that people most often stumble their way into the path they end up on. It makes sense in hindsight, but I certainly had no plan even two years ago to have the position that I have right now. If you had told me sixteen years ago, when I was a park service ranger in the middle of nowhere in Utah, that I would be working at a Wall Street bank, I would have said you were crazy.

Mark Wishnie

I definitely concur with the accidental nature of decision making. The only thought that I would add is that, to the extent that I have placed bets, those bets have not been on the idea that carbon markets or trees or any of the businesses we are in are necessarily going to be terrific markets; rather, I have bet on the people with whom I work. Companies and organizations are no better than the people that form them.

David Cromwell, who teaches at the Yale School of Management, says that he would much rather have a B idea in an A team than an A idea in a B team. I think that is very true. To the extent that I have been successful, it is because I have managed to pick partners to work with who are smarter and better at what they do than I am.

Jason Patrick

I completely agree. I was fortunate when I was entering the space that I had a bit of experience coming from brokerage and analytics, and I had a number of opportunities. To make my decision, therefore, I focused on figuring out what kind of institution I wanted to work for. Did I want to work for a bank, a fund, a private equity fund? Did I want to do analytics?

Once I figured that out, and once I identified what kind of role I wanted – proprietary trading – the most important decision for me was who I wanted to work with. That ended up being a tremendously important decision. Think about who you want to be with every day, and whom you can respect and work with, because when the market improves, there will be jobs.

There have also been some efforts to develop some kind of more generalized biodiversity credit. Climate Focus has actually done some work on that. It is difficult to develop a generalized biodiversity offset since biodiversity is not a constant, and is very difficult to measure and describe. I think that biodiversity enters into markets today because people interested in carbon offsets from forests are also interested in the biodiversity benefits of those forests.

QUESTION 2: The role of carbon in forest management

How big a role does carbon play in the decisions you make with regard to forest management? Are the regulatory standards or the prices for carbon there to make it a current focus, or is it something that you have in the background, thinking about for the future?

Mark Wishnie

When we look at forest investments, carbon potential is definitely something that we evaluate. However, it is rarely, if ever, a significant enough potential income source to be a crucial decision-making factor. We have not yet looked at a project and chosen not to pursue it because the carbon benefits were not available. There have been projects that have been made more attractive because of the carbon benefits associated with them. However, it is rare that the presence or lack of carbon tips the balance when we are looking at an investment in land and trees. Of course, with our environmental markets fund, we invest only in carbon offsets. In most cases where we are acquiring offsets from forest landowners, we are looking at ways to modify existing management to generate offsets rather than initiating a project from the ground up.

Thus, in our experience carbon can be financially important, but it is marginal when you compare it to the value in land and trees.

Marc Hiller

I would add a few points. In U.S. investments, the carbon value is much less important than it is in emerging markets. Since the value you have to pay per hectare for trees in emerging markets is much lower, if you have a commodity like carbon that is traded in global markets, the carbon value can be a far more significant percentage of the total revenues than it is in the United States.

With that said, we do look at carbon value when we are examining opportunities, but it is not our focus. If I have to spend my time on something, I would rather spend it on issues that we have certainty around or that we know are going to be important. What do the growth rates look like? What are the logistics of harvesting? In other words, we focus on the more fundamental forestry questions.

We have spent more time thinking about how we can take advantage of carbon opportunities in our manufacturing investments. This is an area where we have more certainty. For example, there are co-generation facility investments where we can take byproducts from our sawmills or our chip mills and turn that into energy that can then be traded in CDM markets. We have also looked into pellet production for the creation of bioenergy. This would use byproducts to generate electricity as well as carbon credits.

Mark Wishnie

That is a good point, and the same for us. We see more opportunities when you get a step or two downstream from the forest. There is greater potential in part because you can potentially generate CDM credits from energy or industrial processes.

All of our clients, and by extension their investors, require that we examine carbon opportunities prior to making an investment, whether or not it is a value we can realize.

If you had told me sixteen years ago, when I was a park service ranger in the middle of nowhere in Utah, that I would be working at a Wall Street bank, I would have said you were crazy.

QUESTION 3: Aggregating carbon

To what extent have you found ways to aggregate carbon credits created by multiple disparate private landowners? I assume that much of the time the work you do is with large landowners or large corporations. If we wanted to get a large number of people who own land in a city to collectively aggregate and sell carbon credits, are there other mechanisms being developed for that?

Jason Patrick

Yes. There is precedent in the market through the CDM Program of Activities. However, if you are trying to set up a business in which you are looking for real demand for what you aggregate, I would recommend looking at the Urban Forest Protocol developed by the California Climate Action Registry. It is very much a small aggregated approach to urban credit generation.

These approaches still present a relatively small volume means for generating tons, but I look at things from the point of view of what is going to sell. There are a lot of things you can do to generate emissions reductions for which there is no demand in the market, but if you could adhere to a particular protocol, I would imagine you would find a buyer for the credits from your urban forestry project. There are also other ecosystem services that Mark Wishnie and others could speak more about.

Mark Wishnie

There are two projects that we are working on that involve multiple, small landowners that have been aggregated. In neither case are we the aggregator. Instead, in both cases there is an NGO that sits between us and the landowners. The NGOs we work with have done a lot to identify and build relationships with the landowners, and bring with them significant scientific and technical expertise.

These NGOs have been able to accomplish a great deal with the work they have invested combined with resources from other sources that are focused on conservation outcomes. We provide private dollars to acquire the carbon rights that are part of the larger conservation package.

This partnership approach seems to be the primary model. The NGOs or the U.S. government effectively subsidize the aggregation process, which then brings in the private capital needed. In both of the projects in which we are involved, carbon alone would not have paid for the conservation activity that was the basis for the generation of carbon offsets, but the financing it provided was critical to allowing the conservation to happen. In both cases there were local NGOs that had very long term, on-the-ground presence and were able to provide the aggregating function needed to bring these two components together. We need those partners, since we are only 22 people. It would be impossible for us to do the identification work needed on the ground on city block size lots.

QUESTION 4: Insurance for carbon credits

Is insurance used for carbon credits or the investments you are making? Are investors interested in that insurance?

When we look at forest investments, carbon potential is definitely something that we evaluate. However, it is rarely, if ever, a significant enough potential income source to be a crucial decision-making factor. We have not yet looked at a project and chosen not to pursue it because the carbon benefits were not available. There have been projects that have been made more attractive because of the carbon benefits associated with them. However, it is rare that the presence or lack of carbon tips the balance when we are looking at an investment in land and trees.

Marc Hiller

There may be insurance products out there, but I am not aware of any. However, forestry insurance still has major hurdles in terms of making the annual payments and cost. Most institutional investors self insure through diversification.

Would we be interested in a product? The answer is yes, if it was fairly priced. The problem right now is that there are no good actuarial models for forests where our firm tends to invest, i.e. new markets with new opportunities for growing trees. As a result, there is not sufficient data to fairly price the insurance.

Mark Wishnie

There are a couple of assets in Brazil that we are currently working on insuring for fire. I think one of the problems for outside insurers is that if the big forest products companies self-insure, they do so because they believe they have enough forestland and sufficient control and prevention procedures in place so that if they lose something, it is not going to be a very large portion of their overall total. It is therefore difficult to get an insurance product that is inexpensive enough for them to consider it worth paying for. The smaller forest landowners are harder to find, and may not have the resources to pay for insurance. So the ideal market for insurers is somewhere in the middle.

To some extent, some of the traditional TIMOs and investors not used to investment abroad are good targets for insurance. I think that might be driving some of the interest that has led to our work on insurance in Brazil.

Marc Hiller

There is definitely growing interest. I think one of the other challenges to implementation is that in long term forestry investments, the horizon of cash flow is generally quite long. You put a lot of money in when you establish plantations, and you do some amount of maintenance and improvement work, but for many years you have no positive cash flow. So you try to minimize your negative cash flow during that period where the trees are growing.

From our perspective as a private equity firm, our investors do not generally like to have annual fixed costs, so we would be reluctant to go back to them to pay for insurance. As a result, models that try to generate some positive cash flow in the middle of the growth cycle are very important for something like an insurance product.

Jason Patrick

With regards to your question about the larger carbon markets, there have been a couple of insurance products that were developed for use in the primary CDM market. The reason for that is that CDM projects have more than the traditional project finance risks – e.g., operational risk, technology risk, sovereign risk, currency risk. They also have CDM process risk – the idea that getting these projects validated, registered, verified, etc., is a unique risk. There were a couple of products created to address that, one by Munich Re and one by Swiss Re. Neither of those products addresses the entire CDM process cycle, but they were developed. The catch is that

they were extremely expensive, and therefore not really marketable. I heard of a number of people looking at the products, but I did not hear of anybody actually buying them.

One other comment on insurance that I should mention is the concept of reserve buffers, which is essentially an insurance product. It is very well established, especially in the voluntary market.

I did a forest carbon deal three years ago before the Voluntary Carbon Standard existed. We created a reserve buffer to establish what we would do if the deal had trouble. In my view, it is a very effective form of insurance for these types of projects.

QUESTION 5: Ownership of forestland in emerging economies

When you look at forest carbon in emerging economies, what role do land rights play in the decision?

Michael Coren

Land ownership is absolutely question number one for any project, and one that needs utter clarity. This is a huge issue in Brazil and in Indonesia, as well as elsewhere.

It is more than just a legal issue. It has been the source of a lot of protest for REDD. At the moment, both the Climate, Community and Biodiversity Alliance (CCBA) standards and the UNFCCC are making it a priority. They have established that indigenous and community groups must have land rights clarified. USAID has also said it will make land rights a priority before it establishes any big REDD market.

With regards to your question about the larger carbon markets, there have been a couple of insurance products that were developed for use in the primary CDM market. The reason for that is that CDM projects have more than the traditional project finance risks – e.g., operational risk, technology risk, sovereign risk, currency risk. They also have CDM process risk – the idea that getting these projects validated, registered, verified, etc., is a unique risk.

Acknowledgements

We would first like to thank the Emily Hall Tremaine Foundation and the Henry P. Kendall Foundation for their generous support of the *Carbon Finance Speaker Series at Yale*. When we first discussed the prospect of having our second Carbon Finance Speaker Series focused on the role of forests, it was Stewart Hudson and Ted Smith, representing the Emily Hall Tremaine Foundation and the Henry P. Kendall Foundation, respectively, who encouraged, inspired, and ultimately supported this venture. The Center for Business and the Environment at Yale looks forward to continuing these long-term partnerships as we work to advance local and global solutions to climate change by furthering our knowledge and understanding of the important role of environmental markets and finance.

Many thanks to our extraordinary speakers Edwin Aalders, Mark Ashton, Sandra Brown, Shawn Burns, James Cameron, Michael Coren, Phil Cottle, Stavros Dimas, Mark Ducey, Justin Felt, Bradford Gentry, Alec Giffen, Katherine Hamilton, Ellen Hawes, Marc Hiller, Jasmine Hyman, Melinda Kimble, Nancy Kontou, Cary Krosinsky, Duncan Marsh, Frank Merry, Brian Murray, Jason Patrick, Nick Robins, Deborah Spalding, Mark Tercek, Ted Venners, Laurie Wayburn, Mark Wishnie, and Elizabeth Zelljadt for spending time with the Yale, Connecticut, and global communities to educate us about investing in forests for climate protection. Your talks were insightful, provocative, passionate, and inspirational. Thank you for accepting our invitations and for volunteering your time and energy to make us all more prepared for facing the tremendous challenges that lie ahead. To the Yale Global Institute of Sustainable Forestry and Mary Tyrrell, it was a pleasure partnering with you on this complementary speaker series.

There aren't enough ways to say "thank you" to Amy Badner for her devotion, preparation, organization, coordination, consultation, and patience in supporting each of these events. Your help in reserving rooms, developing materials for the speakers, arranging for transportation and parking, managing caterers and receptions, organizing netcasts, processing invoices, and working with students has been incredible. Thank you, Amy, for your continuous support and effort!

Much appreciation as well to our research assistants Daniella Aburto (FES '10), Kate Carman (FES '10), Stuart Decew (FES/SOM '11), Alisha Eisenstein (FES/SOM '11), Matthew Goldstein (SOM '11), Adrian Horotan (FES '10), Raman Jee Jha (TERI '09), Priyanka Juneja (TERI '09), Meredith Trainor (FES '10), and Elizabeth Turnbull

(FES/SOM '11). Thank you all for demonstrating a level of commitment beyond the call of duty and for helping to make this speaker series so special.

Many thanks to the faculty at the School of Management and the School of Forestry & Environmental Studies including Mark Ashton, Rob Bailis, Maureen Burke, Marian Chertow, Dan Esty, Brad Gentry, Will Goetzmann, Lloyd Irland, Erin Mansur, and Geert Rouwenhorst for contributing to the dialogue, challenging our understanding, and sharing your views. Brad, your support, intellect, and genuine concern for each and every individual with whom you interact serve as a model for the ideal mentor. You truly lead by example, and your participation and presence during much of this series did not go unnoticed. Thank you. Will and Geert, we look forward to continuing our growing partnership toward understanding how environmental market instruments like allowances and offsets can become financial tools to solve the world's most pressing environmental problem: climate change.

To our friends at the Yale Office of Sustainability, including Julie Newman, Bob Ferretti, Melissa Goodall, and Keri Enright-Kato, we look forward to continuing to work with you to apply to our great university some of the lessons we are learning in our lecture halls. What a pleasure it was to implement the pilot Yale Community Carbon Fund through the support of the Moses Feldman Family Foundation. It is a privilege to help to provide local solutions to Yale's greenhouse gas emissions strategy, while also engaging students and citizens within our local communities to initiate, develop, and implement successful carbon offsets in New Haven and throughout the State of Connecticut. Our hope is that we can continue this important initiative and take a test pilot program into full implementation!

To Jane Coppock, the Editor of the F&ES Publication Series and Assistant Dean, thank you for being so patient and supportive of this speaker series and publication. We appreciate the lessons that you have shared with us as we have put this publication together. It is our hope that the various chapters presented here will serve to educate students, faculty, policy-makers, NGOs, market makers, entrepreneurs, investors, and business professionals across the board about the important role that forests and land can play in climate protection. Thank you for your support, steadfast guidance, and leadership.

To our friends at The Nature Conservancy – Mark Tercek, Lise Hanners, Ann Fouke, Chad Garbera, Jill Isenbarger, Sarene Marshall, B.J. Ritchie, Cynthia Smith, Adam Welch, Holly Winters; the local chapter trustees and supporters including Leigh Bonney, Barbara David, David and Helen Jaffe, Mike and Faye Richardson, and John Zaro; and the rest of the Conservancy staff – thank you for your support. We had a meaningful and enjoyable time working with you to organize the career and internship track session, and look forward to continuing our long-standing association between Yale University and TNC.

We also want to thank our partners with the Renewable Energy and International Law Network (REIL Network). To Leslie Parker, the leader of our social network venture on renewable energy, thank you for your ability to bring us together. Your ability to connect leaders in the public and private sectors from throughout the world is truly amazing. Our students, faculty, and alumni thoroughly enjoyed the

opportunity to network with the best and the brightest practitioners in the global carbon markets.

And of course, to the staff across Yale University, the School of Management, and the School of Forestry & Environmental Studies, thank you for your assistance in making this speaker series successful. Many thanks to Betsy Dailinger, Rosanne Stoddard, and Tangelia Reed for helping us reserve rooms at the School of Management, the School of Forestry & Environmental Studies, and the McMillan Center for International and Area Studies. You all made our lives a little easier by making the necessary facilities available for us to hold these important events and receptions. To our colleagues in the development offices, including Eugénie Gentry, Tim Northrop, and Sarah Shrewsbury at F&ES, as well as Joel Getz, Kathleen Brown-Dorato, and Elizabeth Costa at SOM, and David Vogel, Jack Fracasso, and Lucy Lewis from the central development office, thank you all for your support of CBEY. You are the enablers. Thank you, Kathy Douglas, for your support of the “big event” with TNC.

To Jaan Elias, Allison Mitkowski, and Alexandra Barton-Sweeney, it has been a pleasure working with you to turn these amazing stories in environmental markets and finance into business case studies for the classroom. The intersection of business and the environment is complex and offers some of the most significant management challenges of our time. We look forward to continuing our work with you to prepare environmental leaders for business and society. Allison and Alexandra, we will miss you!

To our colleagues in the Yale University Office of the Secretary, and Media Services, specifically Lucas Swineford, Carl Schumaker, and Arthur Greisner, thank you for working with us to bring these presentations to the world through Yale netcasts. Arthur, we especially appreciate your professionalism and reliability in engineering the technical aspects of almost all of our talks – and thank you for saving us with the back-up! We look forward to working with you all in the years ahead to continue to utilize the newest technologies and formats to disseminate this important educational information globally. You have helped us expand our audience outside of the classroom and into the world.

And finally, to the reader, we want to thank you in advance for reading this, our second publication on carbon finance. We have only begun to imagine the positive role of financial innovation, and it is critical that we continue to explore and experiment with its potential to help all of us solve the problems that matter. Climate change is obviously one such imperative that is unquestionably worthy of investment and innovation now and in the many years to come. We hope that this publication serves to inspire you to think differently about carbon finance and the role of investing in forests and unforested land for climate protection.

Jaime Carlson, Bryan Garcia, Claire Jahns, Eric Roberts,
and Katie Schindall, Co-Editors
Center for Business and the Environment at Yale

CARBON FINANCE II

Investing in Forests for Climate Protection

About the Editors

Jaime Carlson

Recovery Act Fellow
U.S. Department of Energy
jaime.carlson@aya.yale.edu



Jaime Carlson works with the Recovery Act team in overseeing the financial reporting and projections of \$36.7 billion of Department of Energy stimulus funds appropriated by the American Reinvestment and Recovery Act. Previously, she served as a financial consultant to venture capital fund Launch Capital and private-equity firm Global Environment Fund (GEF). At GEF's sustainable forestry division, Ms. Carlson modeled and assessed strategic acquisitions of South American forestry plantations. As an intern at the Overseas Private Development Corporation, she analyzed the environmental risk profile of forest and agricultural finance projects in emerging markets and developed business guidelines for the first greenhouse gas policy launched by a U.S. federal agency. She has also conducted research for the Model Forest Policy Program, modeling impacts of silvicultural practices on forest carbon stores. Prior to Yale, Ms. Carlson worked in Panama as a project coordinator on a USAID-funded community agriculture project in the Panama Canal watershed and as an environmental consultant and marketing administrator for Conservatorio, a high-end triple bottom line real estate fund. She was a founding member of Apertura Films, a production company focused on developing environmental and social media.

Ms. Carlson holds joint M.B.A. and Master of Environmental Management degrees from the Yale School of Management and Yale School of Forestry & Environmental Studies, and a Bachelor's degree in Biology and Mass Media and Communications from Tufts University.

Claire Jahns

Researcher
Center for Business and the
Environmental at Yale
claire.jahns@yale.edu



Claire Jahns is pursuing joint M.B.A. and Master of Environmental Management degrees at Yale University, focusing on the economics, policy and science of resource management and the potential to develop robust markets for ecosystem-based services and products. While in school, she has engaged in a number of related projects and internships, including: a Summer Associate position with Ecosystem Capital to conduct client-based wetland mitigation and other ecosystem service market valuations; a survey of private equity investment in U.S. ecosystem services for the Open Space Institute; and Carbon Finance Intern at the Pacific Forest Trust to initiate and guide conversations with major international insurance and reinsurance companies on the development of innovative natural hazard and price risk insurance policies for U.S. forest carbon offsets.

Prior to graduate school, Ms. Jahns was an economist at the Chicago Climate Exchange (CCX), where she worked in business development from the inception of greenhouse gas emissions trading. She consulted with potential CCX members in the industrial, power generation and government sectors to interpret CCX rules and calculate their emissions footprints, and served as a primary contact for the offsets program. She is a Berkley Conservation Scholar at Yale and holds a B.A. in Economics and Environmental Studies from Oberlin College.

CARBON FINANCE II

Investing in Forests for Climate Protection

About the Editors

Eric Roberts

Researcher

Center for Business and the Environment at Yale
eric.roberts@yale.edu



Eric Roberts is a joint-degree, M.B.A. and Master of Environmental Management student at Yale University where he focuses on environmental markets, energy investment, and structured finance. He has contributed to the program of industrial ecology expert Prof. Marian Chertow and has served as the teaching assistant for several M.B.A. courses, including Structured Finance, Investor, and Economics. Previously, Mr. Roberts has worked as an associate in the Structured Finance Group at PricewaterhouseCoopers, a financial analyst at Sindicatum Carbon Capital Americas, and a carbon finance analyst at Innovest Strategic Value Advisors (RiskMetrics Group).

Mr. Roberts graduated summa cum laude from Wake Forest University with a degree in Mathematics and concentration in Environmental Studies. Following graduation, he founded a start-up company dealing in diamonds and fine jewelry. He later earned a Masters degree in Mathematics at the University of Arizona and served as a university lecturer in mathematics at the University of Arizona, Norwich University, and Baruch College of the City University of New York (CUNY). Along with Bryan Garcia, he co-edited the 2008 publication Carbon Finance: Environmental Market Solutions to Climate Change.

Katie Schindall

Researcher

Center for Business and the Environment at Yale
katie.schindall@yale.edu



Katie Schindall is a joint-degree, M.B.A. and Master of Environmental Management student at Yale University, focusing on corporate environmental sustainability strategy. Her work with carbon markets reflects both emissions and sequestration perspectives. Ms. Schindall's recent experience includes helping to structure plans for carbon footprinting at Sodexo, a global food and facilities management company, and modeling financing options for the purchase and re-vegetation of conservation land in southwestern Australia through the sale of carbon credits.

Prior to Yale, Ms. Schindall worked at McKinsey & Company as a research analyst and consultant on the firm's social sector projects, advising on strategic issues in the nonprofit, education, and corporate social responsibility arenas. She then served as a consultant with TechnoServe Ghana, helping to develop and evaluate small agricultural enterprises. She later worked on the Gondwana Link, an Australian collaborative land conservation project. She has also served as an Environmental Defense Fund Climate Corps Fellow at Sodexo North America, leading an energy audit to identify opportunities for energy savings at one of their corporate offices as well as across North America. Ms. Schindall graduated summa cum laude from Wellesley College with a B.A. in American Studies.

CARBON FINANCE II

Investing in Forests for Climate Protection

About the Editors

Bryan Garcia

Program Director
Center for Business and the
Environment at Yale
bryan.garcia@yale.edu



Bryan Garcia is the Program Director of the Center for Business and the Environment at Yale. He is responsible for administering the Yale School of Management and the Yale School of Forestry & Environmental Studies efforts to advance research, education, and outreach on business solutions to environmental problems.

He previously served as Director of Energy Market Initiatives at the Connecticut Clean Energy Fund, during which he invested resources that made Connecticut a national leader in voluntary clean energy markets. He created the EPA and DOE award-winning Connecticut Clean Energy Communities Program, which was funded in large part by a REC trading program he devised. Mr. Garcia served as the Climate Change Coordinator for the Governor's Steering Committee on Climate Change where he facilitated interagency and cross-sector collaboration to develop the state's climate change action plan. This plan was the first-of-its-kind in the nation that emphasized the importance of economic development and climate protection. This plan received international recognition and won an EPA Climate Protection Award.

Mr. Garcia is co-founder of Earth Markets, a Connecticut-based company that uses environmental markets and finance, together with community-based marketing and social network strategies, to accelerate the diffusion of clean and efficient energy technologies. He is the Chief Community Officer of Earth Markets. Mr. Garcia is the former Chairman and Co-Founder of the Connecticut Green Building Council, Co-Founder of SmartPower, and serves on the Board of Directors of the Connecticut Hedge Fund Association. He has served on the advisory committees of the Clean Energy States Alliance and The Climate Group.

Mr. Garcia is a returned Peace Corps Volunteer where he specialized in NGO capacity building and environmental education in the Republic of Kazakhstan. He holds a B.S. degree in political economy of natural resources from U.C. Berkeley, an M.P.A. in public-non-profit management and an M.B.A. in finance from New York University, and a Masters of Environmental Management from the Yale School of Forestry & Environmental Studies.

Along with Eric Roberts, he co-edited the 2008 publication Carbon Finance: Environmental Market Solutions to Climate Change.

Learn more about Mr. Garcia by reading "21st Century Environmentalists: Diversity, Hope, Unity, and Action for a Better World."

About the Bio Pages

The Center for Business and the Environment at Yale partnered with the Connecticut Chapter of The Nature Conservancy¹ on various aspects of the Carbon Finance Speaker Series that formed the basis for this publication. The Yale School of Forestry & Environmental Studies and The Nature Conservancy have a long-standing history of working together in a variety of capacities. In fact, graduates of the school work at The Nature Conservancy more than any other organization, agency, business or institution in the world.

To celebrate this association, we wanted to showcase images of Connecticut's natural treasures through photographs taken by Alden Warner.² Alden Warner is a lifelong Connecticut resident who was born in New Haven, graduated from Yale University, and has resided in Farmington for most of his life. Since retiring from the financial world over a decade ago, he has spent much of his time photographing for The Nature Conservancy in Connecticut, the Highlands Coalition, the Appalachian Mountain Club and other conservation organizations.

The landscape photos used and the location for each chapter include:³

- Chapter 1 – Ray Smith Trail (Canton)
- Chapter 2 – Farmington River (Collinsville)
- Chapter 3 – Wood Road (Canton)
- Chapter 4 – Farmington River (Avon)
- Chapter 5 – Wampee Pond (Norfolk)
- Chapter 6 – Hemlocks (Barkhamsted)
- Chapter 7 – Still River from Spillway (Woodstock)
- Chapter 8 – Beeches (Barkhamsted)
- Chapter 9 – Hollenbeck Preserve (Canaan)
- Chapter 10 – Sunny Valley Wewaka Farm (Bridgewater)
- Chapter 11 – Hollenbeck (Cornwall)

The mission of The Nature Conservancy in Connecticut is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. True to its mission, the Connecticut chapter already has protected more than 50,000 acres across the state, maintains 55 local nature preserves, and has about 21,000 members.

¹ The Nature Conservancy, founded in 1951 with a mission to save the Earth's biodiversity, is the world's largest conservation organization, operating over 400 offices in 30 countries. In the past half-century, it has helped protect more than 15 million acres of vital habitat in the United States and over 101 million acres in Canada, Latin America, the Caribbean, Asia, and the Pacific. The Conservancy has over one million members worldwide and manages 1,400 preserves, the largest system of private nature sanctuaries in the world.

² Thanks also go to Peter Otis and Yale University for providing photos for the Editor bio pages.

³ For more of Alden Warner's photography, please visit the following website: <http://www.nature.org/wherewe-work/northamerica/states/connecticut/volunteer/art29131.html>

