THE STATE OF THE INTERNATIONAL FOREST CARBON MARKET 2009

By

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ABSTRACT

Covering roughly 30% of global land area (4 billion ha\(^2\)) and storing more than double the amount of carbon in the atmosphere, forest ecosystems act as an enormous carbon reservoir or “sink”. The potential of forests to play a significant role as emissions offsets in carbon markets and mitigate climate change is immense. A number of factors including the uncertainty of offset potential, project verification and additionality, and uncertain methodology for offset credit transferability have led to limited use of forest carbon offsets in current compliance markets. While current uncertainties prevent forest carbon from playing a large-scale role in established compliance markets, the introduction of credible forest offset standards which reduce project uncertainty, coupled with the ability of forest carbon offsets to act as the “low hanging fruit” of carbon offsets, make forest carbon projects a more favorable option for widespread inclusion in policy making. Seeking to fill information gaps within the highly fragmented forest carbon market, this report is the first of its kind to educate market participants, policy makers, and the general public about the current status of the international forest carbon market. This project serves to accelerate the transfer of information between stakeholders and offer insights into the state, health and future viability of the forest carbon market.
**TABLE OF CONTENTS**

1. About The State of the International Forest Carbon Market
2. Executive Summary
3. Introduction
4. Research Methodology: Capturing the Data
   4.1 Initial Web Surveying
   4.2 Building the Inventory
5. Forest Carbon Basics
   5.1 Global Forest Biology
   5.2 Recent Trends in Forested Land
   5.3 What is a forest carbon offset?
   5.4 Issues
      5.4.1 Additionality
      5.4.2 Permanence
      5.4.3 Leakage
      5.4.4 Further Issues
6. Context within a Regulatory Framework
   6.1 Compliance Markets
      6.1.1 Kyoto Protocol
      6.1.2 The European Union Emissions Trading Scheme
      6.1.3 The Northeastern United States Regional Greenhouse Gas Initiative
      6.1.4 California’s Global Warming Solutions Act and the California Climate Action Registry
      6.1.5 The New South Wales Greenhouse Gas Abatement Scheme
      6.1.6 The Western Regional Climate Change Initiative
   6.2 Voluntary Markets
      6.2.1 The Chicago Climate Exchange
      6.2.2 Japanese Voluntary Emissions Trading Scheme
      6.2.3 The Clinton Climate Initiative
      6.2.4 The Over-the-Counter Market
      6.3 Other Forest Carbon Actors
7. Offsets
   7.1 Project Types
   7.2 Project Lifecycle
      7.2.1 Project Design & Host Country Approval
      7.2.2 Validation
      7.2.3 Registration
      7.2.4 Monitoring
      7.2.5 Verification
      7.2.6 Certification & CER Issuance
      7.2.7 Retirement of credits
   7.3 Project Case Studies
      7.3.1 Carbon Sequestration in Extreme Poverty Communities: Sierra Gorda Biosphere Reserve
      7.3.2 Facilitating Reforestation: Guangxi Watershed- Pearl River Basin
8. Offset Standards
   8.1 Overview of Standards
   8.2 Summary of Standards
      8.2.1 Voluntary Carbon Standard
      8.2.2 Climate, Community & Biodiversity Standards
      8.2.3 Plan Vivo System and Standards
      8.2.4 CarbonFix Standard
      8.2.5 Other Standards

9. Forest Carbon Markets
   9.1 Trading Structure
   9.2 Market Players
   9.3 Forest Carbon Project Characteristics
      9.3.1 Forestry Activities
      9.3.2 Project Size
      9.3.3 Crediting Period
      9.3.4 Carbon Reduction
      9.3.5 Forest Carbon Standards
      9.3.6 Forestry credits on the market

9.4 Areas for improvement
   9.4.1 Transparency
   9.4.2 Trading Marketplace/Portal
   9.4.3 Clearing bottlenecks

10. Forest Carbon Trends and Outlook
11. Literature Cited

Appendix: Glossary
1. About the State of International Forest Carbon Markets

Seeking to fill information gaps within the highly fragmented forest carbon market, this report is the first of its kind to educate market participants, policy makers, and the general public about the current status of the international forest carbon market. The purpose of this report is to provide an overall picture of international forest carbon markets, accelerate the transfer of information between stakeholders, and offer insights into the state, health and future viability of the forest carbon market. The State of the International Forest Carbon Market Report presents the complex challenges unique to forest carbon.

The inventory of forest carbon projects published on a terrestrial carbon portal interface developed by Forest Trends’ Ecosystem Marketplace (www.forestcarbonportal.com) serves as another medium to facilitate the transfer of reliable, transparent forest carbon market data to stakeholders interested in carbon finance in the forestry sector. The Forest Carbon Portal serves as a centrally located repository of information to map the market, connect fragmented market participants, and provide up-to-date market news, case studies, methodologies, and analysis to interested stakeholders.

2. Executive Summary

Land-use practices, including forestry and agriculture, contribute nearly 30% of global greenhouse gas emissions. Deforestation and degradation driven by agricultural expansion not only make substantial contributions to global emissions, but also result in secondary impacts including reduced ecosystem integrity, biodiversity loss, and loss of watershed protection. The uneven distribution of forest resources shifts the potential for forest-based climate change mitigation to particular geographic regions. For example, the relatively high reduction potential
of tropical forests compared with other ecosystems make these regions ripe for forest carbon offset project placement. Favorable international climate policies push for increased offsets from forestry activities in developing nations across Africa, Asia, as well as Central and South America. Forest carbon offsets represent a low-cost option that can provide substantial incentives for climate change mitigation. Scaling up the forest carbon market in the face of so many uncertainties, however, will prove challenging for international policy makers. Fortunately, the use of forest carbon offset activities in voluntary markets serves to reduce the uncertainties associated with forest carbon and ease the transition of forest carbon into more compliance markets.

Analysis of the forest carbon inventory sheds light onto the current state of the international forest carbon market. Today, voluntary markets hold the vast majority of forest carbon offset projects with over 89% market share compared with the 10.7% share held by compliance markets. While forest carbon offset projects are located on every inhabited continent except Oceania, North America supplies the largest number of projects followed by Africa, Asia, South America and Europe. These projects are concentrated in tropical forest biomes due to their high mean carbon storage potential relative to other forest ecosystems. Project developers factor the carbon storage potential of ecosystems into their decision making process and can best maximize the return on their monetary investments by locating projects in regions with relatively higher carbon storage potential. Of the three primary forestry activities, afforestation/reforestation (A/R), improved or integrated forest management (IFM), and reduced emissions from avoided deforestation and forest degradation (REDD), A/R projects comprise half of the market followed by REDD (25.0%), IFM (10.7%), and those projects with multiple forestry activities (14.3%).
A/R projects comprise the largest market share, but they only account for about 1.5% of hectares conserved through forestry practices aimed at carbon sequestration. REDD projects, on the other hand, encompass nearly 97% of total hectares under forestry projects. Overall, forestry projects conserved and forested 2.85 million hectares worldwide. REDD projects generally cover larger land areas, market analysis suggests the majority of projects are concentrated in the small to medium size ranges (100-10,000 hectares), though the supply of micro- and extra-large scale projects remains strong. The minimum crediting period for forest carbon projects is 25 years with several projects being committed for permanent land conservation. The majority of projects though have crediting periods from 25-50 years. Overall, projects in the forest carbon inventory are estimated to reduce a total of 332,038,968.2 tCO$_2$e (tons of carbon dioxide equivalent) over the projects’ lifetimes. The widespread use of third party independent verifiers, particularly those that encourage or require socioeconomic benefits in addition to environmental benefits, suggests market participants look for high-quality forest carbon projects that offer more than emissions reductions.

Carbon offsets do not address the most prominent cause of climate change, emissions from the burning of fossil fuels. Forestry projects that include those generated by REDD projects can help decrease land-use based emissions by halting deforestation and degradation. Because the market has yet to reach maturity, a strengthening presence in voluntary markets, improved market transparency, standardized methodologies, and international endorsement for the inclusion of forest carbon offsets in future climate policy all suggest the international forest carbon market is healthy, viable, and growing rapidly.
3. Introduction

Within the past several decades, global climate change has moved to the forefront of political, social, and economic debate around the world. Many economic tools have been proposed and implemented to mitigate climate change and of the approaches used, carbon cap-and-trade systems are gaining the most popularity worldwide. Current programs include the European Union Trading Scheme, the Northeastern U.S.’s Regional Greenhouse Gas Initiative, the North American Western Climate Initiative and the New South Wales Greenhouse Gas Abatement Scheme.\(^1\)

Covering roughly 30% of global land area (4 billion ha\(^2\)) and storing more than double the amount of carbon in the atmosphere, forest ecosystems act as an immense carbon sink.\(^2\) Through net growth, forests remove nearly 3 billion tons of anthropogenic carbon emissions from the atmosphere annually.\(^3\) While the potential of forests to reduce net emissions is significant, continued degradation and deforestation of these vital carbon sinks has the potential to drastically increase total emissions and may offset any gains current forest stocks provide.

Increased pressure to expand agricultural production is one of the primary drivers of deforestation as it encourages the conversion of forested land to agricultural land.\(^4\) The United Nations Food and Agriculture Organization also reports that forest planting, landscape restoration and natural expansion of forests have increased recently, offsetting some losses due to deforestation. The estimated net change in forested area is -7.3 million hectares per year.\(^5\)

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Serving as a large carbon reservoir, forests have the potential to play vital roles as emissions offsets in carbon markets and mitigators of climate change. However, a number of factors including the uncertainty of offset potential, project verification and additionality, and uncertain methodology for offset credit transferability have led to the limited use of forest carbon offsets in current compliance markets. Current uncertainties prevent forest carbon from playing a large-scale role in established compliance markets, but the importance of including forest carbon in future climate policy is gaining momentum. Despite these uncertainties, the ability of forest offsets to act as the “low hanging fruit” of carbon offsets has increased the attractiveness of these projects allowing them to gain traction in international negotiations.

4. Research Methodology: Capturing the Data

This first of its kind, State of the International Forest Carbon Market (SIFCM) Report features quantitative data and qualitative analysis of the regulated and voluntary markets for forest carbon around the world. A comprehensive literature review of the most recent carbon market publications served as the foundation for the SIFCM Report. The report compiles and synthesizes relevant background information from previous publications and builds a comprehensive examination of the forest carbon market. Summarizing market sizes, forestry activity, project size, crediting periods, carbon reduction and verification standard preferences, and other key market components, the report elucidates trends that have, until now, gone undocumented on a global scale. By educating entities from all stages of the supply chain – from project developers and verifiers to credit aggregators, retailers, and investors – about where the market stands annually, the report will serve to increase the viability of market measures to protect forests, forested ecosystems, and the livelihoods of the people who depend on them.
4.1 Initial Web Surveying

The first stage of building the forest carbon inventory involved a comprehensive survey of the World Wide Web and identified a total of 230 forestry projects across the supply chain including those in the pipeline and registered, traded, and retired projects. A comprehensive database of relevant and available information created from this initial web survey includes project type, location, project developer, biome classification, transaction size, certification standard, market sold on, offset price, offset purchasers and sellers, and other key components of the market. Though this database is comprehensive, the proprietary nature of some project information prevented the completion of the inventory database. Because forest carbon offsets are primarily transacted in the voluntary or “Over-the-Counter (OTC)” markets, ascertaining offset price and specific transaction data proved difficult.

4.2 Building the Inventory

Lack of sufficient information on all 230 projects in the supply chain made it evident that a reliable inventory for market analysis could only include registered and verified forest carbon projects. Verified and registered projects were therefore isolated from the larger inventory to conduct a comprehensive market analysis. Project Design Documents (PDDs), which were submitted during project verification were collected for traded projects and the database was fully built out with all known registered forest carbon projects. Their accompanying documentation was then published on The Forest Carbon Portal. To ensure all projects were included, Forest Trends’ Ecosystem Marketplace issued a press release calling for any additional forest carbon projects on The Forest Carbon Portal. Ecosystem Marketplace also sent requests to respondents to their annual State of the Voluntary Carbon Markets Survey, Climate News Listservs, and known forest carbon stakeholders. Ecosystem Marketplace’s position as an
information clearinghouse for forest carbon and other ecosystem service markets affords them a position at the center of the carbon market network. Although an ever-expanding forest carbon market means forest carbon projects are developed, verified, and registered constantly, the Forest Carbon Inventory is updated frequently to reflect these changes. As a result, it is a reliable, up-to-date source of all verified and registered forest carbon projects.

This SIFCM Report precedes Ecosystem Marketplace’s State of Forest Carbon Report 2009. Their more comprehensive report will include results from the State of Voluntary Carbon Markets 2009 survey that contains forest carbon-specific project questions designed to give insight to the emerging forest carbon market and will be published later this year. Results of the survey will not become available for several months. Now in development, the Forest Carbon Portal will include an interface that allows forest carbon market participants to upload project information and PDDs on their own. This interface will enable the Forest Carbon Portal to be uniquely equipped to continuously gather, research, and publish relevant news and information. It will also connect stakeholders on forest carbon issues. This report’s current inventory is comprehensive and reliable, and provides valuable insight into the current state of the international forest carbon market.

5. Forest Carbon Basics

Forests play a key role in carbon cycling and climate change mitigation. They are, in fact, the globe’s largest terrestrial storer of carbon.\(^6\) Though the potential for climate change mitigation remains high, the forestry sector also generates roughly 18% of global carbon emissions ranking

third only to energy supply and industry as the world’s largest source. When agriculture, land-use change, and forestry emissions are combined, these sources represent up to 30% of global greenhouse gas emissions. Forest emissions result from deforestation and forest degradation, both of which cause the release of CO₂ into the atmosphere, as a result, deforestation and forest degradation are considered carbon emission “sources”. At the same time, afforestation, reforestation, restoration and improved forest management decrease global CO₂ concentrations through carbon sequestration and storage via new forest growth and improved health of current forest stocks. These practices result in net carbon absorption and thus represent carbon “sinks”.

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5.1 Global Forest Biology

Figure 5.2 Global Forest Area
Source: FAO 2006

Forest ecosystems are found on every inhabited continent on the world, cover nearly 30% of global landmass (Figure 5.2), and are home to 80% of the world’s remaining terrestrial biodiversity. Forest carbon stocks are currently estimated to contain 235 gigatons of carbon in their biomass alone. More carbon is stored in forest biomass, forest litter, deadwood, and soil than is stored in the entire atmosphere. Differences in regional climates unevenly distribute forest resources with large stocks of tropical forests near the equator and more temperate boreal forests at northern latitudes. The FAO reports that the world’s ten most forest rich countries, Russia, Brazil, Canada, the United States, China, Australia, The Democratic Republic of Congo, Indonesia, Peru and India, account for two-thirds of the world’s total forested area (Figure 5.3).

There are 57 countries where forests comprise less than 10% of their land area and seven

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countries with no forested land at all.\textsuperscript{13}

5.2 Recent Trends in Forested Land

Between 2000 and 2005, the FAO reported a gross deforestation rate of 12.9 million hectares per year (ha/yr). This rate represents a slight decline from the 13.1 million ha/yr deforestation rate experienced in the 1990s. The primary drivers of deforestation are the conversion of forests to agricultural land for food production, unsustainable logging practices, and land-use change driven by expansion of settlements and infrastructure.\textsuperscript{14}

Offsetting the impacts of deforestation are afforestation, forest restoration, and the natural expansion of forests.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure5.3.png}
\caption{Ten Countries with largest forest area 2005 (million ha)}
\end{figure}


\textsuperscript{14} Nabuurs, Gert Jan. Omar Masera. 2007. ‘Chapter 9: Forestry’. Intergovernmental Panel on Climate Change (IPCC).
Between 1990-2005, large declines in forest area were reported across Africa, Asia and South America (Figure 4). Countries with particularly high deforestation rates include Brazil, Indonesia, Sudan, Myanmar, Zambia, Tanzania, Nigeria, the Democratic Republic of Congo, Zimbabwe, and Venezuela. The resulting contribution to greenhouse gas emissions has been considerable. In addition to anthropogenic destruction and degradation of global forest stocks, natural disturbances (which are largely under-reported) including forest fire, pests, droughts, floods, and other climatic events significantly deplete the carbon storage capacity of existing forest stocks. Continued deforestation and forest degradation have caused declines in global carbon stocks of forest biomass by 1.1 gigatons annually.

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In addition to large-scale changes in forested area in the past few decades, ownership and ecosystem functioning of existing forests have been modified. Although 84% of forested lands are publicly owned, private ownership is on the rise. Over the last twenty years, the FAO reported an increase in community empowerment, decentralized decision making, and private sector involvement in forest management that has led to increased land privatization. Despite global trends indicating increased forest privatization, Europe (excluding Russia), Oceana, and North, Central, and South America have a consistently higher proportion of private ownership than other regions like Africa and Asia.\textsuperscript{18}

Primary forests defined by the FAO are those forests “of native species, in which ecological processes are not significantly disturbed and there are no clearly visible indications of human

activity.” These undisturbed ecosystems, accounting for 36% of forested area, are becoming increasingly susceptible to human influence. Since 1990, an estimated 6 million ha/yr of primary forests have been lost or modified, an alarming trend that gives no indication of slowing. Once modified from their pristine state through human intervention, selective logging, and modification, primary forests are reclassified as modified natural forests. In the absence of human intervention, modified forests have the capacity to revert back to primary forests, a trend that is being observed in several European countries and Japan.

Comprising just 3.8% (140 million ha) of total forested land, forest plantations have been expanding. Considered subset of planted forests, they are often comprised of introduced species. These forest resources generally serve two functions: production of wood and fiber (78%) and conservation of soil and water resources (22%). From 2000-2005, forest plantations increased by roughly 2.8 million ha/yr, though the majority of those operated in a production rather than conservation capacity.

5.3 What is a forest carbon offset?

A proliferation of innovative approaches to climate change mitigation has emerged with an emphasis on improved natural resource management. The most prominent and arguably

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promising of these approaches focuses on land-use change. Serving a vital role in the regulation of global carbon stocks, forests present an attractive, low-cost opportunity for widespread carbon storage. These forest carbon offsets are financial instruments that quantify a measurement of reduction in GHG emissions through the uptake of CO$_2$ into a forest ecosystem carbon sink. One forest carbon offset represents the equivalent of one metric ton of CO$_2$ that was either removed from the atmosphere or was prevented from being released into the atmosphere.$^{27}$

5.4 Issues

Not all forestry projects are created equal. To address this, carbon offset standards have been designed to provide particular guidelines for all forestry projects. However, the potential for forestry-based carbon mitigation differs greatly across project types, biomes, climates, political and social environments, geographic regions, and etcetera. Differences in emissions reduction potential, while attempting to standardize projects, raise many concerns surrounding project additionality, permanence, leakage, and other issues.

5.4.1 Additionality

Arguably the most controversial issue concerning forest carbon offsets, additionality is a concept requiring that projects would not be implemented without the additional financial incentive provided by the sale of emissions certificates.$^{28}$ Passing the test of additionality ensures buyers that their funds do not solely generate benefits for project developers, but rather that they are the decisive measure for project implementation.$^{29}$ Buyers want to be sure they aren’t paying

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$^{27}$ Lane, Carol. August 6, 2008. “All About Forest Carbon Offsets”. Published by Conservation International at: http://www.conservation.org/EN/Advisors/Clearinghouse/Articles/Forest Carbon Offsets.aspx, last visited 02/20/2009


landowners for forestry activities that would be economically feasible without offset payments. To address buyers concerns, all scrutinized forest carbon offset standards include some form of guidelines like the A/R CDM additionality tool.\textsuperscript{30}

### 5.4.2 Permanence

**Permanence**, the concern over whether carbon reductions are realized over the long-term, is an issue of particular concern in forest carbon projects because of forest ecosystems potential to act as both carbon sinks and sources.\textsuperscript{31} Due to the long lifespan of forest carbon projects and the uncertainties arising from future conditions in project locales, market participants emphasize the need for reliable and permanent emissions reductions. Issues such as political instability, unsustainable forest management, and natural disruptions serve to undermine the integrity of forests as potential long-term carbon sinks. One option to mitigate risks associated with project permanence is to retain in a buffer system enough carbon credits to cover any variance from expected carbon offsets.

### 5.4.3 Leakage

**Leakage** arises when the amount of a project’s direct carbon emissions reductions are undermined by carbon releases elsewhere. Significant changes to local behavior arise when large-scale forest carbon offset projects are developed and implemented. These changes arise when local activities are moved outside project boundaries resulting in greenhouse gas emissions attributable to the project that are released outside the project area. Leakage effects can arise for many reasons and bring into question the true climate benefits of forest-based offset projects. For example, the conversion of agricultural land to forests resulting in carbon offsets may have


leakage effects if the surrounding region is deforested to make up for the lost productive land. In effect, greenhouse gas emissions are simply shifted from inside the project area to outside the project area, and in such instances, there are no net greenhouse gas reductions even though carbon offsets were issued.

5.4.4 Further Issues

The process by which project baseline emissions are calculated is also a concern for market participants. Creating a baseline allows for comparisons of climate benefits, with and without project implementation, by forecasting the most likely development scenario for the project area. In creating a baseline, project developers are able to quantify a plausible value for a project’s net greenhouse gas benefits.

Administration of projects often results in project emissions that arise from activities surrounding project implementation. Project emissions generally contribute only a fraction of the net greenhouse gases of a forest carbon project. Emissions from machinery usage and fuel consumption for transportation, for example, must be measured and included in project GHG budgets to ensure appropriate carbon accounting.

In unregulated carbon markets, issues arise over project transparency. The lack of uniform verification standards emphasizes the need to make transparent and adequate project information available to market participants, from project developers and sellers, to independent verifiers and registries, to offset buyers. In order to address transparency issues, the majority of project

standards created web interfaces, making the criteria that projects must meet more clear and transparent to interested parties.

Regulators and offset purchasers require constant monitoring of the carbon flux in forestry projects to ensure offset permits match actual levels of carbon sequestration. For ex post forest carbon projects (offset credits calculated after the carbon offset has been generated), periodic emissions monitoring is required before offsets are issued, while for ex ante (credits calculated in advance of the offset being generated) project monitoring allows project verifiers to adjust permit levels to better match actual reductions. The lengthy project lifetimes unique to forest carbon projects necessitate constant and consistent monitoring of project emissions reductions.

Afforestation and reforestation projects raise concerns over ecosystem integrity when forested land is planted with a monoculture or with non-native species. With the use of non-native species there is always the risk those plants will become invasive and out-compete the surrounding natural vegetation. Drastic land-use alteration common to afforestation/reforestation projects has the potential of causing unforeseen impact on the overall health and integrity of natural ecosystems and can hinder the ability of these ecosystems to adapt to disease, pests, natural disasters, and the changing climate.

Until recently, social impacts such as land rights issues involving indigenous populations were not adequately addressed in large-scale land use projects such as forestry. Social implications of forestry projects and land rights issues concerning the often under-represented indigenous peoples are hotly debated and a strong point of contention between actors on the international
policy-setting stage. Many NGO and indigenous peoples organizations are concerned that land encroachment by project developers, governments, and outsiders threaten the livelihoods of these under-represented populations and that forest carbon actors should keep their “hands off” indigenous peoples’ forests.

Concerns also arise surrounding the quantification of CO₂ fixation that projects produce. CO₂ absorption is dependant on many factors including forest species composition, stand age, local climate, forest density, and management practices. Given the large variation across forests, standardization of CO₂ fixation calculations is difficult and raises concerns.

The abundance of issues regarding forest carbon projects highlights the difficulties in forest carbon project implementation and measuring. While the standards attempt to pinpoint and address these and other concerns through detailed guidelines, the complex nature of forest carbon sequestration results in most project developers making conservative offset calculations to mitigate risk. The ‘conservative approach’ requires all estimations are made with the best available scientific knowledge, yielding precise and accurate offset levels without overestimation.

6. Context within a Regulatory Framework

International and domestic climate change initiatives increasingly rely on market-based mechanisms to mitigate climate change. Carbon markets involve the buying and selling of carbon credits that are either distributed by a regulatory body in the form of emissions permits that allow the right to pollute, or through the generation of GHG emissions reductions through
offsets.\textsuperscript{33} There are two primary markets for forest carbon offsets. One is the compliance or regulatory market where entities such as governments, companies, or individuals buy and sell carbon offsets to comply with their government regulated allotment of carbon dioxide emissions. The other is the voluntary market, also known as the over-the-counter (OTC) market. While forest carbon is just one of many offset activities available in the overall carbon portfolio, forest conservation and restoration are unique in that projects are both cost-effective and capable of yielding immediate, measureable emissions reductions. Despite great potential, forest carbon offsets are not permitted in all compliance markets. They have, however, captured a large market share of OTC markets.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{carbon_markets_v6.png}
\caption{Various carbon markets classified by voluntary and regulatory market status and demand for carbon credits by different types of buyers (see Appendix for abbreviations)}
\begin{flushright}
Source: Update on Markets for Forestry Offsets, 2007
\end{flushright}
\end{figure}

### Figure 6.2 Overview of potential buyers and markets for forest carbon offsets

<table>
<thead>
<tr>
<th>Name of Market</th>
<th>Does the Market target project-based offsets from forestry?</th>
<th>If yes, can offsets come from developing countries?</th>
<th>Overall Volumes (not limited to projects or forestry)</th>
<th>Operational Since</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyoto Protocol</td>
<td>Yes</td>
<td>Yes</td>
<td>US $13bn for primary and secondary CDM in 2007</td>
<td>2005</td>
</tr>
<tr>
<td>European Union Emissions Trading Scheme (EU ETS)</td>
<td>No</td>
<td>N/A</td>
<td>2bn tCO2e @ US $50.1bn in 2007</td>
<td>January 2007</td>
</tr>
<tr>
<td>California's Global Warming Solutions Act (AB 32) and CCAR</td>
<td>Yes</td>
<td>Likely</td>
<td>N/A</td>
<td>2001</td>
</tr>
<tr>
<td>New South Wales Greenhouse Gas Abatement Scheme (GGAS)</td>
<td>Yes</td>
<td>No</td>
<td>25.41 mmtCO2e @ US $224.10mm in 2007</td>
<td>January 2003</td>
</tr>
<tr>
<td>Western Regional Climate Change Initiative</td>
<td>Not decided yet</td>
<td>Not likely yet</td>
<td>N/A</td>
<td>Created in 2007. Not yet operational</td>
</tr>
<tr>
<td>Chicago Climate Exchange (CCX)</td>
<td>Yes</td>
<td>Yes</td>
<td>23 mmtCO2e @ US $72mm in 2007</td>
<td>December 2003</td>
</tr>
<tr>
<td>Japanese Voluntary Emissions Trading Scheme (JVETS)</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>May 2005</td>
</tr>
<tr>
<td>Clinton Climate Initiative</td>
<td>Not decided yet</td>
<td>Likely</td>
<td>US $3.69bn for climate-change related activities</td>
<td>August 2006</td>
</tr>
<tr>
<td>Over-the-Counter Market</td>
<td>Yes</td>
<td>Yes</td>
<td>42.1 mmtCO2e @US $258.4mm in 2007</td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### 6.1 Compliance Markets

Compliance markets, like the Kyoto Protocol’s Clean Development Mechanism or the European Union Emissions Trading Scheme are regulated by mandatory carbon reduction schemes.\(^{34}\)

##### 6.1.1 The Kyoto Protocol

Linked to the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto protocol is a legally-binding international treaty ratified by 184 countries and committing 37 industrialized countries and the European Community to reduce GHG emissions by a total of 5.4% below 1990 levels by 2012.\(^{35}\) Unlike the UNFCCC, which encourages industrialized nations to stabilize GHG emissions, ratification of the Kyoto Protocol mandates they do so.\(^{36}\)

The Kyoto Protocol, adopted in Kyoto, Japan on December 11, 1997, has strict rules for

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implementation called the “Marrakesh Accords”. Developed at the 7th Conference of the Parties (COP7) in Marrakesh in 2001 and entered into force February 16, 2005, the Protocol contains three ‘flexibility mechanisms’ for industrialized countries to meet their targets in a cost-effective ways. 37 These mechanisms are Emissions Trading, Clean Development Mechanism (CDM), and Joint Implementation (JI). 38 While nations must meet targets primarily through domestic measures, these three tools provide countries with additional means to meet targets.

- **Emissions Trading**: An allowance-based trading scheme in which countries with binding targets are allocated ‘assigned allowance units’ (AAU) which they may trade with one another to fulfill their Kyoto targets. In addition to AAUs, countries are allowed to trade Certified Emissions Reductions (CERs) generated from CDM project activity, Emission Reduction Units (ERUs) from JI projects, and Removal Units (RMUs) based from land use, land-use change and forestry (LULUCF) activities like afforestation and reforestation. 39

- **Clean Development Mechanism (CDM)**: A project-based transaction system in which countries with binding emission-reductions can purchase carbon offsets called Certified Emissions Reductions (CERs) by financing GHG-reduction projects in developing countries. CERs from CDM projects must be registered and approved by the Designated National Authorities overseen by the CDM Executive Board. In addition to providing a flexibility mechanism for developed countries to meet emissions reduction targets, CDM projects stimulate sustainable development and measurable emissions reductions. 40

- **Joint Implementation (JI)**: Similar to the CDM, a project-based transaction system in which countries with binding emission-reductions can purchase carbon offsets called Emission Reduction Units (ERUs) from GHG-reduction projects implemented in other developed countries or in countries with transitional economies. 41

Currently, forestry activities recognized under the Kyoto Protocol’s Clean Development Mechanism are limited to afforestation and reforestation (A/R). 42 To be eligible for A/R, project developers must demonstrate that forests did not cover the converted land before or on December

Evidence may be presented in the form of historical land cover data, aerial photographs or satellite imagery, ground-based surveys, or as a last option, rural appraisals. Projects must comply with A/R definitions set forth by the host-country and the CDM Executive Board (CDM EB). Once A/R projects are identified, they enter a thorough and often time consuming design, approval, validation, monitoring, verification, certification, and CER issuance process described later in section 7. Each step in the forestry project cycle has strict guidelines including CDM methodologies and verification standards that aim to minimize concerns over additionality, baselines, permanence, and leakage.

Unlike CDM projects, the Kyoto Protocol’s Joint Implementation Mechanism recognizes not only A/R projects, but also forestry activities related to land-use, including forest management and agricultural carbon sequestration. Similar to projects under the CDM, A/R projects must meet definitions set forth by host-nations and the CDM EB. Afforestation land must be without forest for a minimum of 50 years and reforestation project areas cannot have been forest before December 31, 1989. JI projects undergo strict scrutiny throughout the project cycle to ensure uniform treatment of projects while minimizing concerns over additionality, baselines, permanence, and leakage.

The World Bank estimates that in 2007 the primary and secondary CDM markets were valued at over US$12 billion with primary market contracts of over 551 million tCO₂e (ton of carbon

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Joint Implementation projects during the same year were valued at US$499 million from an estimated 41 million tCO\textsubscript{2}e of carbon transactions.\footnote{Capoor, K. and Ambrosi, P. 2008. State and Trends of the Carbon Market 2008, The World Bank, Washington, DC.} As of the end of 2008, the CDM had only one registered forestry project; an afforestation/reforestation project in the Guangxi province of China.

The first commitment period under the Kyoto Protocol expires in 2012. COP13 in Bali, Indonesia in December 2007 and COP14 in Poznan, Poland in December 2008 laid the groundwork for development of a Post-Kyoto International Climate Framework. This new framework is expected to be drafted and signed during COP15 in Copenhagen, Denmark in December 2009. Negotiations at COP13 and COP14 placed major emphasis on the expanded inclusion of forestry projects, though the extent to which forest carbon offsets will play a role is yet to be determined.

6.1.2 The European Union Emissions Trading Scheme

Launched in January 2005, the European Union Emissions Trading Scheme (EU ETS) is the world’s largest emissions trading program and was established to help 27 European nations meet their Kyoto obligations.\footnote{Ecosystem Marketplace. 2008. ‘Forests: Taking Root in the Voluntary Carbon Markets’. Washington, DC. USA. www.ecosystemmarketplace.com.} To meet emission reduction targets, each EU nation is issued EU emissions allowances (EUAs) that may be traded with other EU nations. In addition to EUAs, the EU ETS ‘linking directive’ allows for the sale and purchase of carbon credits, both CERs and ERUs, generated by approved Clean Development Mechanism (CDM) or Joint Implementation
(JI) projects. The inclusion of all three Kyoto flexibility mechanisms aides EU states in meeting their goals on both national and regional levels.

The EU ETS was developed to include two phases. Implemented between 2005 and 2007, Phase I emerged as the ‘learning phase’ in which only CO₂ emissions from energy activities, production and processing of ferrous metals, mineral industry and pulp, paper and board activities were regulated. These activities comprised 40% of EU CO₂ emissions. Phase II, which began in 2008 and runs through 2012, initiated the ‘Kyoto Commitment Period’ during which additional CDM and JI projects may be included via the ‘linking directive’. Allowances issued in either Phase I or Phase II can only be used for compliance in their respective phases and are not interchangeable.

The EU ETS emphasis on reducing GHG emissions from industry and energy, combined with methodological insecurities and permanence concerns in forest projects, motivated a ban against Land-Use, Land-Use Change and Forestry (LULUCF) offsets in the ETS until 2020. Following the adoption of the ‘linking directive’ the EU Commission is under mandate to periodically review technological and methodological improvements in the forestry and LULUCF sectors for possible inclusion in later stages.

By the end of Phase I’s first year of trading, an estimated 362 million tCO\textsubscript{2}e were transacted at a market value of €7.2 billion (or US$9 billion).\textsuperscript{57} The World Bank reported that in 2007 the EU ETS traded more than 2 billion tCO\textsubscript{2}e with a market value totaling roughly US$50.1 billion.

6.1.3 The Northeastern United States Regional Greenhouse Gas Initiative

Ten Northeastern and Mid-Atlantic states have initiated the first mandatory, market-based effort in the United States to reduce GHG emissions. Established in 2003, the Regional Greenhouse Gas Initiative (RGGI) caps emissions from the power sector and aims to reduce these emissions 10% by 2018.\textsuperscript{58} While the RGGI market did not formally launch until January 2009, the first auction of emissions permits occurred in September 2008.\textsuperscript{59} Proceeds from the sale of emissions allowances aid in the development of a regional low-carbon-intensity, clean energy economy by investing in renewable energy, energy efficiency, and clean energy technologies.\textsuperscript{60} RGGI helps companies meet their compliance obligations through both a phased market approach, in which required reductions are initially modest and then scaled up, and the limited allowance of carbon offset permits.\textsuperscript{61} Offsets in the initial compliance period are constrained to 3.3% of total power plant emissions, but may be increased to 5% or 10% of compliance obligation if permit prices rise above the pre-determined threshold of US$7 per tCO\textsubscript{2}e and US$10 per short tCO\textsubscript{2}e, respectively.\textsuperscript{62}

Current RGGI offset policy permits the use of five project types in offset portfolios: landfill methane capture and destruction, sulfur hexafluoride (SF\textsubscript{6}) emissions reductions, carbon


\textsuperscript{60} http://www.rggi.org/home, Last visited February 22, 2009.


sequestration due to afforestation, end-use efficiency in the building sector from avoided or reduced fuel emissions, and avoided methane emissions from agricultural manure management.\textsuperscript{63} In addition to these five project categories, RGGI allows, under limited circumstances, the inclusion of emissions credit retirements from mandatory programs outside the US.\textsuperscript{64} CERs generated by the Clean Development Mechanism are one example.\textsuperscript{65} While RGGI recognizes offsets generated by afforestation, it excludes those afforestation projects originating from developing countries.\textsuperscript{66}

The true market value of RGGI is yet to be determined. The second auction for emissions allowances in December 2008 had 69 participants from the financial, energy, and environmental sectors and raised a total of US$107 million.\textsuperscript{67} A 2006 review by Baker & McKenzie estimates RGGI market value will exceed US$1 billion in 2009, though the contribution of forestry projects is unknown.\textsuperscript{68}

\subsection*{6.1.4 California’s Global Warming Solutions Act and the California Climate Action Registry}

California’s Global Warming Solutions Act (AB32) is a statewide initiative designed to reduce GHG emissions from all major industrial sectors.\textsuperscript{69} Under AB32, the California Air Resources Board (CARB) is mandated to ‘create, monitor and enforce a GHG emissions reporting and

\textsuperscript{64} http://www.rggi.org/offsets, last visited February 22, 2009.
Operational since 2001, the California Climate Action Registry (CCAR) documents emissions reductions and serves as a voluntary GHG registry to ‘protect, encourage, and promote’ early compliance with the goals set forth by AB32. CCAR also aids in the calculations of GHG emissions baselines against which future mandatory reductions will be applied. The registry now serves primarily as a reporting mechanism and does not directly handle offset projects. CCAR does allow its members to report emissions reductions from offset projects, including forestry projects and those from developing countries. Three sectors, landfill, livestock, and forestry activities, have developed GHG emissions reduction protocols developed by the CCAR. The inclusion of forestry as one of only three developed protocols suggests that many of the future offset credits will come directly from the forestry sector.

6.1.5 The New South Wales Greenhouse Gas Abatement Scheme

The New South Wales Greenhouse Gas Abatement Scheme (NSW GGAS) is a mandatory GHG abatement program launched in January 2003 that focuses on emissions from the production and use of electricity. GGAS set per capita reductions targets of 7.27 tCO$_2$e to be met by individual electricity retailers and other actors that participate in the purchase or sale of electricity through ‘mandatory benchmarks based on the size of their shares of the electricity market’. GGAS distributes New South Wales Greenhouse Gas Abatement Certificates (NGACs) based on market

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These certificates must be surrendered based on annual emissions. Firms unable to meet their targets must either pay a penalty of AU$11.50 (US$9) per tCO2e, purchase additional credits, or purchase offsets. Additional credits may be generated through a range of activities that target greenhouse gas emissions including projects which plant trees to sequester carbon.

Forest carbon projects must meet strict eligibility requirements for accreditation including:

- Forests must be in New South Wales (therefore excluding projects from developing countries)
- Carbon Sequestration Rights must be registered on the land title
- Forests must be ‘human induced’ through activities such as direct planting or seeding
- Total forested area must exceed 0.2 ha and must not have been forest since December 31, 1989
- Trees must have the capacity to reach at least 2m in height at maturity
- Forests must have a minimum of 20% tree crown cover of the total land mass
- Carbon must be sequestered for a minimum of 100 years
- The accredited organization must commit to a reporting schedule to show the carbon sequestered in the generation of credits remains in forests

Carbon credits from sources outside the state, such as CERs generated by CDM projects or ERUs generated by JI projects, are not accepted by GGAS. In 2007, the World Bank reported approximately 25.41 million tCO2e traded for an estimated market value of US$224.10 million, making GGAS the world’s second largest regulated cap and trade GHG market behind the Kyoto markets.

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6.1.6 The Western Regional Climate Change Initiative

Six of the western United States including California, New Mexico, Oregon, Washington, Arizona, and Utah, along with the Canadian provinces of British Columbia, Manitoba, and Quebec, joined forces in February 2007 to form the Western Regional Climate Initiative (WRCAI). The purpose of the WRCAI is to ‘identify, evaluate and implement ways to collectively reduce GHG emissions in the Western region of the U.S. and to achieve related co-benefits’. WRCAI participants agree to a regional emissions reductions goal of 15% by 2020 from a 2005 baseline. Not currently operational, the WRCAI is expected to cover an estimated 886 million tCO$_2$e per year by 2012. At present there are no forest carbon projects included but high potential exists for WRCAI participants to purchase for their offset portfolios voluntary credits generated by forest-based activities in developing countries.

6.2 Voluntary Markets

Voluntary markets allow organizations, companies, or individuals to voluntarily offset their GHG emissions by purchasing offsets. While compliance markets have much larger offset transaction volumes than voluntary markets, the total exclusion or limited inclusion of forest carbon in current compliance markets has increased the market share forestry projects capture in OTC markets. Voluntary markets have potential to be an important, immediate source of measurable GHG emissions reductions and can play a vital role in mitigating climate change as

the international community struggles to agree upon a significant, over-arching climate change framework.

6.2.1 The Chicago Climate Exchange

Developed by Richard Sandor, a former chief economist at the Chicago Board of Trade, and launched in late 2003, the Chicago Climate Exchange (CCX) is ‘North America’s only voluntary, legally binding rules-based greenhouse gas emission reduction and trading system’. The CCX trades six different types of GHGs converted into units of tCO$_2$e and referred to as carbon financial instruments (CFIs). Members who voluntarily join the CCX agree to a mandatory reductions policy taking place in two phases:

- Phase I: The pilot phase of the CCX which took place between 2003-2006 included mandatory emissions reductions of 1% a year from the baseline (determined by averaging emissions over the period of 1998-2001).

- Phase II: From 2006-2010, CCX participants agree to reduce total emissions to 6% below the baseline by 2010. For members participating since the CCX launch, Phase II only translates to an additional 2% reduction over baselines following Phase I. New members must reduce the entire 6% below baseline during this 4-year period.

Members who agree to this plan cap emissions at a stated level. Members who exceed allowances under their binding cap must either purchase allowances from other members who are below their targets or purchase offsets to meet their emissions targets. The CCX’s unique approach to a voluntary yet legally-binding GHG trading scheme is different from other

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voluntary markets in that trading is primarily allowance based with registered offsets accounting for only 10% of total verified emissions reductions.95

Since the inception of CCX in late 2003, membership has grown from 19 institutions to over 350 institutions from the government, business, and philanthropic sectors.96 As membership has grown, so too has transaction volume and total market. In 2007, CCX transaction volumes reached 23 million tCO2e at a value of US$72 million, an improvement over 2005 when only 1.45 million tCO2e were traded at a value of US$2.7 million. First quarter 2008 reports indicated a market value of over US$81 million suggesting sustained market growth in recent years.97 Though 2008 year-end total market value is not yet known, the CCX January 2009 report estimates a 363% increase in total transaction volume from 2007 to 2008.98

The CCX allows offsets arising from forest activities but strict guidelines must be met for inclusion. The IPCC currently defines four forestry mitigation measures that the CCX uses as guidelines for forestry project inclusion. A/R, reduced deforestation and degradation, improved forest management, and carbon retention in wood products are all allowed within the CCX trading protocol.99 Forest projects are thoroughly scrutinized and must be approved by the CCX Forestry Committee.100 They must also be independently verified by third party auditors.101 Project developers must agree to a contract term of at least 15 years to maintain land under

95 www.chicagoclimatex.com/docs/offsets/General_Offsets_faq.pdf
forest. Of earned offsets, 20% must be retained in a reserve pool to mitigate risks associated with catastrophic losses and other reversals.\textsuperscript{102}

### 6.2.2 Japanese Voluntary Emissions Trading Scheme

Launched in 2005, the Japanese Voluntary Emissions Trading Scheme (JVETS) is a cap and trade system that provides cost-effective measures to aid Japanese companies that voluntarily implement GHG emission reductions.\textsuperscript{103} Three such measures include the provision of subsidies, voluntary commitments, and emissions trading.\textsuperscript{104} JVETS focuses on domestic energy efficiency and fuel switching efforts and, as of now, specifically excludes forestry projects for carbon offsets.\textsuperscript{105}

### 6.2.3 The Clinton Climate Initiative

The Clinton Climate Initiative (CCI) was launched by the Clinton Foundation in August 2006 and is an operating voluntary program formulated to produce direct GHG emissions reductions.\textsuperscript{106} With a total budget of US$3.69 billion for investments in climate change mitigation efforts, a portion of the funds is allocated for the purchase of carbon offsets projects.\textsuperscript{107} Forestry projects are not currently a focus of CCI initiatives, but CCI has high potential as a voluntary market for forestry-based offsets in developing countries.\textsuperscript{108}


6.2.4 The Over-the-Counter Market

Representing the largest portion of the overall voluntary carbon market, the over-the-counter (OTC) market has been likened to the ‘wild west’ by reporters and analysts. Unlike the CCX or other registries where participation is voluntary, carbon credits known as Verified (or Voluntary) Emissions Reductions (VERs) are rarely traded on exchanges and as a result, transaction data is not easily discernable or widely distributed.\(^{109}\) Similar to other voluntary market segments, an emissions cap does not drive carbon credit demand so no regulatory body attempts to standardize VERs across project types, standards, prices, or transaction volumes. Deals may be as simple as mutually agreed upon credit transactions between project developers and purchasers but often involve multiple actors including project developers, aggregators/wholesalers who primarily deal in bulk transactions, retailers who generally sell small amounts to individuals or organizations, and brokers who facilitate transactions between buyers, sellers, and other intermediaries.\(^{110}\) The general lack of regulation in the OTC market creates a highly fragmented, deal-by-deal market with innate challenges for stakeholder involvement. The lack of transparency across transactions and the disaggregation of projects and stakeholders make tracing and navigating the OTC market difficult.

As a consequence of the unregulated nature of OTC markets, sources of carbon offsets are quite diverse and include a vast array of project types including renewable energy, energy efficiency, forestry and land based activities, methane capture, and geological sequestration.\(^{111}\) Lack of

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regulation allows transactions to be determined by buyers and sellers, and thus all project types, including various forestry activities, can have trade potential.

For the reasons stated above, historical tracking of the OTC market has been extremely difficult. Ecosystem Marketplace annually surveys voluntary market participants to quantify transaction volumes and market values. In 2007, they reported that forestry land based projects comprised roughly 18% of the OTC market. This ties forestry projects with energy efficiency projects as the second largest sector behind renewable energy projects.¹¹²

Ecosystem Marketplace estimates that in 2007 the entire OTC market transacted 42.1 million tCO₂e at a market value of US$258.4 million, up from 2006 transaction volumes and market value of 14.2 million tCO₂e and US$58.5 million, respectively.¹¹³ Overall, regulated markets have experienced much higher transaction volumes and market values (2.9 billion tCO₂e worth and estimated US$63.7 billion), but in recent years OTC markets are experiencing faster growth (194%) than regulatory markets (77%).¹¹⁴

6.3 Other Forest Carbon Actors

In addition to primary compliance and voluntary markets, there are several other small scale or potential forest carbon actors:

- **Oregon Climate Trust**: Established in 1997, the Oregon Climate Trust (OCT) is a non-profit organization focused on solving global climate change through investments in

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high-quality GHG offset projects, and on advancing carbon offset policy.\textsuperscript{115} As part of this initiative, the OCT actively pursues forestry-based offsets in developing countries to expand its trade portfolios.\textsuperscript{116} To date, OCT has three forestry projects in its offset portfolio and has offset 2.7 million tCO$_2$e through US$8.9 million of investments.\textsuperscript{117}

- **Australian Global Forest Fund**: As of March 2007, the Australian Government pledged US$160 million to reduce deforestation in the Asian-Pacific Region.\textsuperscript{118} It also encourages contributions to the Fund from other nations.\textsuperscript{119} Focusing on forestry-based projects including new forest planting, avoided forest destruction, and increased sustainable forest management and harvesting, the Fund hopes to reduce deforestation.\textsuperscript{120} The Fund also promotes and boosts law enforcement to curb illegal logging practices.\textsuperscript{121} Investment is focused on projects in Indonesia, Papua New Guinea, Vanuatu, and other Pacific island nations with high deforestation rates.\textsuperscript{122}

- **Norwegian Government Fund**: Though not yet formalized, the Norwegian Government Fund will purchase significant amounts of carbon assets to meet the goal of national ‘carbon neutrality’ by 2050.\textsuperscript{123} While no specific projects are currently targeted and the size of the fund is not finalized, the Prime Minister stated that projects across the globe (and likely those in the forestry sector) will be eligible for purchase.\textsuperscript{124}

- **Midwestern Regional GHG Reduction Program**: In November 2007, the governors of nine Midwestern U.S. states (Iowa, Illinois, Kansas, Michigan, Minnesota, Wisconsin, Indiana, Ohio, and South Dakota) and Canadian state premiers from Manitoba and Ontario agreed to a Midwestern Greenhouse Gas Reduction Accord. The program recognizes the region’s significant impact on carbon emissions and climate change.\textsuperscript{125} Expected to begin in 2012, the program aims to reduce GHG emissions 16\% below 2005 baseline levels.\textsuperscript{126} A market-based cap-and-trade system covering most economic sectors is now in the early stages of development and expected to include an estimated 1.1 billion tCO$_2$e per year by 2012.\textsuperscript{127} The Midwestern Regional GHG Reduction Program (MRP)

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\textsuperscript{125} http://www.midwesternaccord.org/news.html, last visited February 22, 2009.
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initiated a Greenhouse Gas Advisory Group to assess the most viable and credible offset projects for inclusion.\textsuperscript{128} The role of forest-based projects has yet to be determined.\textsuperscript{129}

- **Forest Carbon Partnership Fund**: In 2007, the World Bank created the Forest Carbon Partnership Fund (FCPF). Estimated at US$250 million by 2012 and US$1 billion by 2015, the FCPF will finance projects that reduce emissions from deforestation.\textsuperscript{130} First focusing on developing tropical countries, the FCPF hopes to use tradable carbon credits generated from forest-related emissions reduction to help countries implement incentives and strategies that curb deforestation and forest degradation.\textsuperscript{131}

### 7. Offsets

Improvements in market development continue to facilitate the voluntary and required carbon emissions reductions of market participants. Offsets are a flexibility mechanism included in trading schemes to both aid with GHG emissions compliance and encourage further market participation. While the markets recognize a wide variety of project types including energy efficiency, clean technology, geological sequestration and methane capture among others, forests emerge as a market leader due to their “charisma” and their promise of tangible benefits through emissions reductions, sustainable resource management, watershed protection for local communities, and improved ecosystem health and integrity. The practices covered by the term ‘forestry-based carbon offsets’ vary greatly.

#### 7.1 Project Types

Numerous forest-based activities are eligible for carbon credits in compliance and voluntary markets. The two primary project types are afforestation and reforestation. Arguably the most controversial of forestry activities, Reduced Emissions from Avoided Deforestation and Degradation (REDD) projects are gaining support in compliance markets. Two other primary

forest-based offset activities are improved forest management (IFM) and agro-forestry projects.

Below are descriptions of the primary forest-based offset activities:

- **Reforestation**: “Reforestation” as defined by the UNFCCC is ‘the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989’.132

- **Afforestation**: The UNFCCC defines “afforestation” as ‘the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources’.133

- **Reduced Emissions from Avoided Deforestation and Forest Degradation**: Reduced Emissions from Avoided Deforestation and Forest Degradation (REDD) projects focus efforts on regions of high deforestation and degradation rates with the goal of halting destructive practices. These projects generate credits by incentivizing forest conservation through the prevention of emissions from deforestation and degradation that would have occurred in the absence of carbon credits. An important distinction with these particular projects is that unlike A/R projects that sequester carbon, REDD projects actively reduce emissions.

- **Improved (or Integrated) Forest Management**: Improved forest management (IFM) focuses on measures that slow deforestation, protect biodiversity and contribute to climate change mitigation strategies.134 IFM practices attempt to incorporate ecological, social, political, and economic concern by the fusion of sustainable economic development with the reduction of GHG emissions and biodiversity concentration that forest ecosystems provide.135

- **Agro-forestry**: As defined by the United States Department of Agriculture, Agro-forestry ‘intentionally combines agriculture and forestry to create integrated and sustainable land-use systems. Agro-forestry takes advantage of the interactive benefits from combining trees and shrubs with crops and/or livestock’.136

- **Restoration**: Focuses on the restoration of degraded forested lands

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132 UNFCCC Definitions available at unfccc.int, last visited February 23, 2006.
133 UNFCCC Definitions available at unfccc.int, last visited February 23, 2006.
136 Defined by the USDA National Agro-forestry Center @ [http://www.unl.edu/nac/], last visited February 23, 2009.
In addition to the primary A/R, IFM and REDD projects, several other forestry projects are considered forest-based offsets. These include carbon retention in harvested wood products, product substitution, and producing biomass for bio-energy.137

7.2 Offset Lifecycle

The mechanics of a project lifecycle vary depending on an array of factors including project goals, location, forestry activity, project scale, project developers’ motivations, and the targeted market (voluntary or regulatory). This section uses a CDM project as an example to provide an overview of the typical forest carbon project lifecycle and focuses on the mandatory project activities (see Figure 7.1). The overview in this section assumes the project meets the prerequisites for participation in the CDM including eligible activities, project scope, and requirements for regulatory inclusion set forth by both the regulatory entity and Designated Operational Entity (DOE). A DOE is an independent third party entity accredited by the UNFCCC for project validation and/or verification. This overview begins with the project design step.

Figure 7.1 CDM forestry project lifecycle overview (Grey boxes designate common, but not mandatory activities while blue boxes correspond to officially required steps) Source: Guidebook to Markets and Commercialization of CDM Forestry Projects, 2007.

7.2.1 Project Design & Host Country Approval

The first step in the project lifecycle is project design. At this stage a Project Design Document (PDD) is written outlining the project’s concept and evaluating whether the project will meet guidelines set forth by the registering entity, in this case the CDM Executive Board (CDM EB). In particular, the PDD describes specific forestry activities and includes the project timeline, regional geography and technical details. It also states the parties involved, calculates expected emissions reductions, addresses additionality, leakage and permanence concerns, assesses impacts on local communities and the environment, and establishes a monitoring plan.

Depending on the host country’s preferred internal procedures, PDDs are either submitted to the host country’s designated national authority (DNA) for a Letter of Approval or to the DOE for
validation. Host country approval, by means of a LoA submitted by the DNA to the DOE is required by the CDM before completion of project validation.

7.2.2 Validation

The CDM requires projects be validated by an accredited, independent third party certified body approved by the CDM EB. Submission of the PDD and supporting material to the DOE is required to ensure the project meets all relevant standards and criteria set forth by the DOE for validation. In addition to approval by the DOE, PDDs are made available to the public via the Internet over a period of 45 days so comments from NGOs, interested parties, and other stakeholders can be solicited. Once these steps are completed, the DOE makes a decision and projects passing all criteria receive a positive validation report.

7.2.3 Registration

A positive validation report is made available to the public and submitted along with the PDD to the CDM Executive Board. The registration process should take no more than 8 weeks but for projects where one involved party or at least three members of the CDM EB request a review the process may take up to 4-5 months to complete.

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7.2.4 Monitoring

Once the CDM EB registers a project and implementation has begun, project developers are required to ensure continuous monitoring in accordance with the plan set forth in the PDD. The monitoring process may be carried out by the involved parties or contracted out to third party monitors. The purpose of this process is to ensure emissions reductions, project activities, and forest health are all consistent with calculations used in drafting the PDD.

7.2.5 Verification

In order for the CDM EB to certify and issue CERs for projects they must undergo verification by a DOE. Verification refers to the process by which project implementation, monitoring, and emissions reduction authenticity are audited and compared against the PDD. Projects found to meet the criteria established by the DOE and carried in accordance with the PDD receive a positive verification report. This verification step is critical because emissions reductions certification and CER issuance cannot be completed until the CDM EB receives a positive verification report.

7.2.6 Certification & CER Issuance

Submission of a positive verification report results in project certification by the CDM EB. During the certification process, the CDM EB issues a statement of approval indicating the forestry project has successfully generated a given amount of emissions reductions in accordance with the Kyoto Protocol’s rules and regulations. Once all the above steps are successfully
completed and no additional project reviews are requested, the CDM EB issues the approved amount of credits and has 15 days for the issuance of CERs.

7.2.7 Retirement of credits

Retirement defines the end step of the carbon credit lifecycle in which credits are permanently retired and can no longer be resold. Tracking of retired credits is extremely difficult once the originally issued credit changes hands but the emergence of ‘retirement registries’ is bringing more transparency to the process.\textsuperscript{148} It is not until a supplier or final buyer retires a carbon credit that the fulfillment of GHG offset of emissions by credit is completed.

7.3 Project Case Studies

7.3.1 Carbon Sequestration in Extreme Poverty Communities: Sierra Gorda Biosphere Reserve

\[\text{Source: Case Study included in Forest Carbon Inventory and adapted from www.forestcarbonportal.com/inventory.php}\]

8. Offset Standards

To improve the integrity of carbon offsets as a means of reducing GHG emissions, stakeholders have urged the development of rigorous and verifiable offset criteria that is strictly enforced by accredited, independent, third party verifiers when projects are submitted for approval. The purpose of the standards is to ensure efforts have been undertaken to address issues such as additionality, leakage, permanence, double counting, baselines and sustainable resource management. Independent third party auditors verify that projects satisfy all criteria set forth by the standard before certifying the projects will mitigate the effects of climate change by reducing carbon emissions. Each standard develops their own individual criteria that may include additional ‘co-benefit’ requirements for wildlife conservation, local community livelihood improvements and maintenance of natural ecosystem integrity. This is particularly important in
the voluntary market where there is no regulatory body to make sure projects are well designed and produce tangible emissions reductions or co-benefits. Projects based on well-respected standards are often traded at a premium price because their quality is assured.

8.1 Overview of Standards

Ecosystem Marketplace called 2007 the ‘Year of the Standard’ because of the large increase in the number of third party standards. While there is a wide array of standards, only a handful of standards garner significant market capitalization. This section serves as an overview of the most commonly utilized standards in carbon markets to date.

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<tr>
<th>Standard</th>
<th>CCB</th>
<th>Carbon Fix</th>
<th>Plan Vivo</th>
<th>Voluntary Carbon Standard</th>
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<td>Net positive climate, community and biodiversity benefits</td>
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<td>Supply of carbon credits from rural communities in developing countries promoting sustainable development</td>
<td>Creation of credible ex-post carbon credits</td>
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<td>Permanence Addressed?</td>
<td>Yes</td>
<td>Yes, 30% risk buffer</td>
<td>Yes, minimum 10% risk buffer</td>
<td>Yes, 10-60% risk buffer</td>
</tr>
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<td>Leakage Addressed?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Socio-economic Benefits</td>
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<td>++</td>
<td>++</td>
<td>+</td>
</tr>
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<td>Environmental Benefits</td>
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<td>++</td>
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<td>Certification intervals</td>
<td>5 yearly</td>
<td>2-5 yearly</td>
<td>Recommended 3-5 yearly</td>
<td>5 yearly financial incentive</td>
</tr>
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<td>2-6 months</td>
<td>3-6 months</td>
<td>3-18 months</td>
<td>2-4 months</td>
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</tbody>
</table>

Figure 8.1 Overview of the four primary forestry offset standards (adapted from Forestry Carbon Standards 2008)

+ are set in relation to requirements of each standard. The more +, the higher the transparency of co-benefits level of a standard

8.1.1 Voluntary Carbon Standard

Developed by The Climate Group, the International Emissions Trading Association (IETA), the World Business Council for Sustainable Development (WBCSD), and a partnership of business,

governmental, and non-governmental institutions, the Voluntary Carbon Standard (VCS or VCS AFOLU) covers all major land-use activities including agriculture land management and forestry (afforestation, reforestation, re-vegetation, improved forest management). The VCS was designed to standardize credits in the voluntary carbon market and to provide transparency and credibility of offsets. In addition to generating ex-post carbon credits, the VCS attempts to stimulate investment in emissions reductions, carbon offsets, and innovative technologies that keep validation and verification costs low.

8.1.2 Climate, Community & Biodiversity Standards

The Climate, Community and Biodiversity Alliance (CCBA), a group of research institutions, corporations, and non-governmental institutions including The Nature Conservancy, Conservation International, Intel, CATIE, and Weyerhauser developed the Climate, Community, & Biodiversity Standards (CCBS) to critique land-based carbon mitigation projects in the early stages of their development. Focusing on carbon reduction, community and biodiversity ‘co-benefit’ potential, projects must address not only climate change, but also provide local community support and biodiversity conservation. The CCBS applies to all land-based carbon offsets including forestry projects (afforestation, reforestation, REDD, agro-forestry, restoration, conservation, and agriculture). There are no geographical restrictions to projects that seek certification and while CCBS certification does not result in the generation of carbon credits, the

standard has been applied in both voluntary and compliance markets.\textsuperscript{156} It is important to note that the CCBS does not include a carbon accounting standard. Consequently, the CCBA recommends that for now the CCBS be used along with an existing standard, such as the VCS or CDM, to adequately evaluate a projects’ carbon accounting.\textsuperscript{157}

\textbf{8.1.3 Plan Vivo System and Standards}

The Plan Vivo System and Standards was created and run by the Edinburgh Center for Carbon Management (ECCM) from 2002-2008 and is currently managed by the non-profit BioClimate Research and Development (BR&D).\textsuperscript{158} Plan Vivo focuses on community-based agro-forestry projects and emphasizes sustainable livelihoods in rural areas.\textsuperscript{159} They see the creation of verifiable carbon credits as a tool to achieve their goals.\textsuperscript{160} The Plan Vivo System and Standards generates and verifies \textit{ex ante} (for sequestration projects) as well as \textit{ex post} (for avoided deforestation projects) carbon credits.\textsuperscript{161} Currently, there are three operational projects in Mexico, Uganda, and Mozambique producing Plan Vivo certified carbon offsets.\textsuperscript{162} The Plan Vivo system also seeks to provide social and biodiversity benefits in addition to transparency, additionally, foundations for permanence, an ethical option, and scientific and technical partnerships within the greater carbon market.\textsuperscript{163}
8.1.4 CarbonFix Standard

The Carbon Fix Standard (CFS) was launched in late 2007 and was developed by CarbonFix, a UNFCCC accredited non-profit organization with expertise in forestry, the environment, and development aid.\textsuperscript{164} Currently, the CFS only includes forestry projects that convert non-forest to forestland, including planted conservation forests, planted sustainably managed forests and protection of areas leading to forested land.\textsuperscript{165} Updated versions of the CFS allow for the application of agro-forestry projects for verification.\textsuperscript{166} The verification process requires a CFS-approved auditor who must be an independent third party to certify projects based on the CFS criteria. With an emphasis on sustainable forestry management, which must be maintained throughout the life of the project, the goal of CFS is to provide a high quality, practically applicable standard.\textsuperscript{167} Certified projects receive \textit{ex-ante} credits for use in the voluntary market.\textsuperscript{168} A primary goal of CarbonFix is to provide transparent information regarding approved projects to interested stakeholders. They do this by online posting of project documents excluding financial calculations like the price of CO\textsubscript{2} certificates.\textsuperscript{169} CFS also allows customers to purchase CFS certified credits online directly from project developers and takes a 3% commission of the sale price.\textsuperscript{170}

8.1.5 Other Standards

Other benchmark standards in carbon markets exist, but some do not apply to forest carbon. One such standard is the **Gold Standard** initiated by a partnership of environmental, business, and governmental organizations including WWF.\(^ {171} \) While The Gold Standard is applicable to voluntary projects, CDM projects, and currently being developed for application to JI projects, it is restricted for use on renewable energy and energy efficiency projects.\(^ {172} \) Under the current criteria, forestry and all land-use based projects are excluded.\(^ {173} \)

Another standard, **The Chicago Climate Exchange Offsets Program**, is a set of criteria that must be met in order for projects to be accepted and traded in the voluntary CCX marketplace.\(^ {174} \) The standard divides projects into seven categories including landfill methane, agricultural methane, agricultural soil carbon, forestry, renewable energy, coalmine methane, and rangeland soil carbon management.\(^ {175} \) To apply to the offsets program, forestry projects must be initiated after 1990.\(^ {176} \) Those projects that pass an initial screening are invited to submit proposals to the CCX for preliminary approval. An approved, independent, third party auditor must also verify them before project developers may register for credits to be traded on the exchange.\(^ {177} \) While the CCX Offsets Program includes forestry in their standard, it is limited in that it is only a preliminary standard and does not apply to offsets traded outside the CCX. As a result, forestry projects have not garnered large market capitalization.

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9. Forest Carbon Markets

A comprehensive inventory of all known forest carbon offset projects compiled from internet research, individual project submissions, and industry research is the source of the data presented in this report. Seeking to provide the highest quality data, this report isolates only those projects validated and registered. Exclusion of projects in the development or “pipeline” phase, as well as those currently being validated and registered, allows for an accurate overall market analysis representative of real market supply, demand and project characteristics.

9.1 Trading Structure

Demand for forest carbon projects is driven by a multitude of factors including their regulatory context. Currently, the only approved methodologies within the CDM are for A/R projects. As a result, those aimed at reduced emissions from deforestation and degradation are excluded. Despite the inclusion of A/R projects, the CDM only had one project successfully registered as of the end of 2008, an afforestation/reforestation project in China’s Guangxi province. Two more projects have so far been registered in 2009. The two projects already registered in the first

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178 Since the forest carbon inventory only includes completed and confirmed projects known to be verified and registered, and projects are being verified and registered daily, these numbers should be considered conservative estimates of the forest carbon markets. In other words, it is very likely some projects that meet the inventory criterion for inclusion are absent, and thus the forest carbon market is no doubt larger than the totals represented in this report.
quarter of 2009 represent a 200% increase from all previous years indicating recent movement in CDM markets. While several other regulatory markets have begun accepting forestry projects, the demand for forest-related carbon sequestration credits and the only source of demand for REDD projects is the voluntary OTC market. Due to the limited regulatory inclusion of forest carbon offset projects described earlier, it is no surprise that the vast majority of projects were transacted on the voluntary “over-the-counter” market (Figure 9.1). Voluntary OTC markets captured an 85.71% market share of forest carbon inventory representing 24 of the total 28 projects. One project (3.57%) was voluntary but traded on the Chicago Climate Exchange. The remaining forestry projects, comprising 10.71% of the total market share, were registered under the CDM. The overwhelming portion of forest carbon projects transacted on voluntary OTC markets emphasizes the fragmented nature of forest carbon markets.

### 9.2 Market Players: Forest Carbon Offset Supply & Demand

Covering five continents and sixteen countries, forest carbon projects are geographically dispersed. Based on the forest carbon inventory, North America has the largest market share of forestry projects with 42.86%, followed by Africa with 21.43%, Asia with 17.86%, South America with 10.71% and Europe with 7.14% (Figure 9.2). While globally widespread, more than two-thirds (70.83%) of forestry
projects are found in tropical forest biomes, primarily tropical rainforest. The remaining projects were located in temperate (22.92%) and subtropical (6.25%) forest ecosystems. The relatively high mean carbon storage potential of tropical forest ecosystems compared to other forest ecosystems explains these distributional trends (Figure 9.3).

<table>
<thead>
<tr>
<th>Ecosystem</th>
<th>Carbon storage (t C/ha)</th>
</tr>
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<tr>
<td>Tropical Forest</td>
<td>220</td>
</tr>
<tr>
<td>Temperate Forest</td>
<td>150</td>
</tr>
<tr>
<td>Boreal Forest</td>
<td>90</td>
</tr>
<tr>
<td>Grassland/Savanna</td>
<td>15</td>
</tr>
<tr>
<td>Agriculture</td>
<td>5</td>
</tr>
</tbody>
</table>

**Figure 9.3 Mean carbon storage of various ecosystem types**

Project developers factor the carbon storage potential of ecosystems when determining where to locate forestry projects. Since the purpose of forest carbon offsets is to provide measurable carbon dioxide reductions, decision-makers can best maximize the return on their investments by locating projects in regions with high carbon storage potential. Tropical forests represent some of the most biodiverse ecosystems on the planet and conserving these tropical forest ecosystems not only has enormous implications on GHG mitigation potential but also plays a significant role in species conservation. A map forest inventory project distribution is below in figure 9.4.

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There are 28 forest carbon projects currently in inventory. Mexico, Madagascar and the USA each have the largest number of projects with three, followed by Canada, Honduras, Brazil, Uganda and China with two each. Nicaragua, Panama, Bolivia, England, Moldova, Mozambique, Malaysia, Indonesia and India each have one (Figure 9.5).
9.3 Forest Carbon Project Characteristics

9.3.1 Forestry Activities

The highest share of forest carbon projects by forestry activity is in afforestation/reforestation (50.0%). The only three CDM projects currently validated and registered are all afforestation/reforestation projects so it is no surprise that these activities are also the most popular in voluntary OTC markets. Voluntary markets are used to “test-drive” future regulatory schemes. For market participants wanting to get a feel for transacting offsets in future compliance markets, these voluntary markets offer an opportunity to test projects and gain valuable experience.

Reforestation projects were among the first carbon offsets generated and dominated the market for all offset project types until 2004, then reemerged as the leader in 2006.\(^\text{180}\) The relatively long history of afforestation/reforestation projects has brought with it a greater understanding of ecosystem benefits and project methodologies which has in turn reduced uncertainty and increased interest in these projects.

Interestingly enough, REDD projects comprise 25.0% of the overall forest carbon market despite the controversies surrounding additionality, leakage, permanence and accounting questions which prevented their inclusion from current Kyoto markets. The high demand for REDD projects appears to be a result of the international endorsement to reduce emissions from deforestation proposed under the Bali Action Plan during the United Nation’s Framework Convention on Climate Change conference (COP13) in Bali, Indonesia December 2007. Since COP 13 in Bali, the role of REDD in international climate change policy remains a key topic in international negotiations and is seen by many carbon market participants as an emerging leader in future carbon offset markets.

Improved (or Integrated) Forest Management projects (IFM) held the smallest market share as a project type with only 10.7%. In addition to these single-use projects, 14.3% of all forestry projects were multiple-use projects that targeted two or more forestry activities, suggesting a greater understanding of how to best utilize forest land for carbon sequestration as well as a broader knowledge of multiple forestry methodologies.

9.3.2 Project Size

Forestry projects in the inventory conserved or forested a total of over 2.8 million hectares. Projects varied greatly by their land area and ranged from 0 to 750,000 hectares. Figure 9.7 shows the wide distribution of project sizes from micro (0-100 ha), small (100-1,000 ha), medium (1,000-10,000 ha), large (10,000-10,000 ha) to extra large scales (>100,000 ha).
Approximately 17.9% of these projects are micro scale projects covering less than 100 hectares.

The largest portion (57.1%) of projects fell in the small to medium category of 100 – 10,000 hectares. Large to extra large sized projects consisting of those greater than 10,000 hectares captured a 25.0% market share. While projects are scattered across a wide range of sizes, analysis suggests projects tend to be concentrated in the small to medium size range, though the supply of micro and extra large scale projects remains strong.
Projects vary greatly in size, but inventory is not evenly distributed across project types. Afforestation/reforestation projects make up 50.0% of all forestry projects, but they only account for 1.48% of total hectares. Improved forest management and multiple forest activity projects represented 10.7% and 14.3% of all forest carbon projects respectively but only a small fraction (1.44% and 0.28%) of total forest carbon project area. REDD projects made up by far the largest portion of the total hectares with 96.79% or 2.7 million of the 2.85 million hectare total. The high percentage of total hectares managed under REDD projects is not surprising given the relatively high cost of planting trees for A/R projects compared to the cost of preserving existing forests in REDD projects in the inventory. It is the relatively “cheap” nature of REDD projects in the inventory and the large scale with which projects can be implemented that suggest far reaching climate change mitigation benefits can be achieved with lower levels of investment.
9.3.3 Crediting Period

Though forests are able to sequester carbon for extended periods of time, permanence is an issue of particular concern in forest carbon projects. When maintained and allowed to thrive, forests act as an enormous carbon sink, but when burned for land clearing or fuel, deforested for wood products or shelter, or destroyed by natural disasters like forest fires, forests act as carbon sources. Consequently, uncertainties surrounding future social, economic, and environmental conditions in project locations emphasize the need for reliable and permanent carbon reductions provided by long-lived projects.

Figure 9.9 shows the composition of projects by the duration of their crediting period. The crediting period duration is a conservative estimate of project life spans, and generally represents only a portion of a project’s duration because they may be renewed for longer periods. In addition, it is unknown what happens to forested land after credits cease. The shortest crediting period in the current inventory is 25 years for a native species reforestation project in Panama. Data was not available for 5 projects, but of the remaining projects in the inventory, 54.55% had crediting periods between 25 and 50 years. Projects with crediting periods between 50-75 years
made up 9.09% of the inventory and projects lasing 75-100 years made up 27.27%. It is of note that two projects in the forest carbon inventory are designated for permanent land conservation.

9.3.4 Carbon Reduction

Over the duration of all the projects in the current forest carbon inventory, excluding two that had no data, total estimated carbon reductions stand at 332 million tCO$_2$e. These emissions are roughly equivalent to the annual carbon dioxide emissions of Japan or India.\(^{181}\)

Project developers’ estimates of carbon credit potential per unit area vary drastically from 0 to 55 tCO$_2$e per hectare per year. Figure 9.10 shows estimates of the annual carbon credit potential of forest carbon projects per hectare. The inventory data indicates 71.43% of projects expect annual carbon reductions of less than 15 tCO$_2$e per hectare. These numbers are consistent with a 2008 report published by the Tropical Agricultural Research and Higher Education Center (CATIE) which found that carbon credit potentials less than 15 tCO$_2$e/ha/yr are realistic.\(^{182}\) Despite this research, 23.81% of projects on the inventory estimate annual carbon credit reductions of greater than 20 tCO$_2$e/ha/yr.


9.3.5 Forest Carbon Standards

Despite the majority of projects being transacted on unregulated OTC markets, 61.54% of carbon credits were verified by six primary third party standards (CCB 21.4%, CDM 17.9%, Plan Vivo 10.7%, California Climate Action Registry (CAR) Protocol 7.1%, CCX 3.6% and CarbonFix 3.6%). Projects were verified using buyers’ standards in 14.3% of cases, while 10.7% of projects used seller’s standards. An additional 10.7% of projects were verified using other standards such as ISO 14064 developed by the
International Organization for Standardization and those developed by SGS. The large portion of projects verified by third party standards, especially those like CCB and Plan Vivo which encourage and even require socioeconomic benefits in addition to environmental benefits, suggests market participants are looking for more than mere carbon reductions. In fact, they are demanding legitimate high quality forest carbon projects.

9.3.6 Forestry credits on the market

Forest carbon projects tracked through the forest carbon inventory indicate just over 3 million credits generated by forestry activities have been transacted in voluntary and regulatory markets. Of the 3 million credits transacted, an estimated 1.43 million credits have since been retired. Price data for forest carbon projects proved particularly difficult to track because forest carbon is not included in regulatory markets and because voluntary markets are highly-fragmented and are transaction-by-transaction based. The proprietary nature of project information and lack of transparency in voluntary markets provided specific data on just 3 projects and price ranges for another 5 projects. As is characteristic of the overall voluntary carbon market, forest carbon experiences a wide distribution of credit prices ranging from US $3 to US $32.4.\(^{183}\)

The range of forest carbon price data provided by the inventory is consistent with that of a recent survey of voluntary carbon market participants in which credits generated by afforestation/reforestation and avoided deforestation projects reportedly sold for between US$2-$50.\(^{184}\) The report found the most expensive average offset credits were for native and plantation

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\(^{183}\) US $32.3 was calculated from €24 using the 2008 currency conversion of US$ 1.35 to 1€

afforestation/reforestation at US$6.80 and US$8.20 per tCO$_2$e respectively. Avoided deforestation generated credits transacted for a more modest US$4.80 per tCO$_2$e.\textsuperscript{185}

9.4 Areas for improvement

In recent years the international forest carbon market experienced dramatic improvements in forest carbon methodologies. An emphasis on legitimate, transparent, high quality carbon offsets drove a drastic growth in forest carbon demand. Despite recent progress, the forest carbon market has a long way to go toward establishing itself as a healthy, transparent, and viable long-term offset market deserving of inclusion in regulatory markets. This section highlights three of the primary areas for improvement.

9.4.1 Transparency

Lack of transparency in voluntary carbon markets coupled with the limited number of projects in regulatory markets makes the compilation of a forest carbon inventory particularly difficult. First of all, project developers, especially those in the third world, are disconnected from international carbon markets. In addition, forest carbon data in voluntary markets is proprietary so few project developers, buyers, wholesalers, and credit retailers are willing to publish this information, particularly price data. Because information is limited, market participants and policy makers tend to believe the forest carbon market is uncertain and complicated. This hinders investment and makes it difficult for forest carbon offsets to become a more prominent offset activity in both voluntary and regulatory markets.

9.4.2 Trading Marketplace/Portal

The lack of transparency is further impacted by the absence of a global forest carbon marketplace or portal that can disseminate information between market participants, policy makers and the general public. Seeking to fill information gaps within the forest carbon market, Forest Trends’ Ecosystem Marketplace created www.forestcarbonportal.com, an online resource for the most up-to-date forest carbon news, reports, and projects. Work done in the construction of the forest carbon inventory used in The State of the International Forest Carbon Market 2009 report is included on the forest carbon online portal and updated as projects are registered. The purpose of the Forest Carbon Online Portal is to educate forest carbon participants, accelerate the transfer of information between stakeholders and those interested in carbon finance in the forestry sector, catalyze relationships, develop a network of best practices, and map the marketplace.

9.4.3 Clearing bottlenecks

One complaint voiced by project developers is that the validation, registration, and verification processes are complicated and slow. Several major revisions are typically required before acceptance and these processes are time consuming and the results uncertain. The increased demand for carbon offset projects due to a greater international emphasis on climate change mitigation results in more projects requesting validation, registration and verification than can be accommodated by available resources. While the CDM has 1,440 registered projects to date, more than 4,200 projects are in the pipeline including over 40 forestry projects, and there is a bottleneck at the registration and verification steps. Effects of these complications can be seen in the low number of CDM forestry projects that have been registered. At the time this report

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186 Unfccc.int
was written, only 3 projects were registered with the CDM. Not only are these processes time consuming, but there is great uncertainty as to whether a project will be approved even after appropriate documentation is ultimately submitted. Indeed, many forestry projects requesting CDM registration are rejected or subject to multiple revisions which are costly and can harm the economic feasibility of projects, especially micro scale projects where registration and verification processes make up a significant portion of project costs. With increasing demand for carbon offsets, bottlenecks will only be exacerbated. This emphasizes the need to improve the registration and verification process through increased transparency and fluidity, as well as by adding more project validators and verifiers.

10. Forest Carbon Trends and Outlook

In December 2009, delegates from over 180 countries will converge on Copenhagen, Denmark for the highly anticipated UNFCCC COP14 meeting. The road to Copenhagen through COP meetings in Bali and Poznan has proved to be rocky and rife with conflicting opinions. Ultimately though, nations appear committed to the goal of creating a clear, meaningful, and binding post-Kyoto climate framework.

Forest carbon markets currently remain highly fragmented and the future uncertain, but several factors indicate change is on the horizon. First, many Annex I countries that ratified Kyoto and are required to reduce emissions remain above their targets. As we near the end of the Kyoto commitment period in 2012, it is clear many countries will struggle to reduce emissions and will look towards offset markets for help. The expected increase in demand could have tremendous impact on the international forest carbon markets by providing much needed investment and publicity. COP meetings in Bali and Poznan focused attention on land-use, land-use change and
forestry projects as immediate, fungible, and viable options to address climate change. International actors now appear ready to recognize the potential of REDD projects as a way to reduce net GHG emissions and also provide substantial co-benefits to local communities and ecosystems. Past negotiations highlighted uncertainties surrounding forest carbon but the road to Copenhagen has focused on finding solutions and improving the attractiveness of forestry activities. Consequently, a strong international consensus has emerged for the post-2012 second phase of the Kyoto Protocol to include mechanisms that provide incentives for forestry, particularly REDD projects. In order for widespread regulatory inclusion in regulatory markets and for additional actors to be brought on board, a clear consensus must emerge on methodological and technical aspects of forestry activities that historically created uncertainty and prevented forestry activities from being included in past climate agreements.

While scaling up the forest carbon market in the face of so many uncertainties will certainly prove challenging for international policy makers, voluntary markets can serve to bridge the gap and ease the transition of forest carbon into more compliance markets. As this report highlights, forest carbon projects may be omitted from many regulatory schemes but are present and successful in voluntary markets. In recent years, several schemes in the United States have emerged in spite of the government’s failure to pass significant, comprehensive, binding climate legislation. Actors not bound to emissions reductions but rather fueled by ‘carbon neutrality’ motivations are increasingly active in purchasing offsets to compensate for their own emissions by financing projects reducing emissions elsewhere. Many of these buyers want to feel their contribution has made a difference and forest carbon, which serves as a tangible, easily
understood example of carbon sequestration, has a clear advantage over alternative offset activities.

During the recent economic crisis, reduced investment and high price volatility in carbon markets have demonstrated that the international forest carbon market must make significant progress in establishing itself as a healthy, mature, and viable long-term market. The news is not all bad. The economic crisis at hand has caused sharp declines in carbon prices as a result of scaled back production and thereby reduced emissions. Recent developments suggest the economic crisis may offer a reprieve for forests at risk from deforestation and degradation driven by agricultural expansion. In Brazil, collapsing commodity prices, most notably soy and beef, reduce incentives to degrade and destroy forests for cropland. Current estimates suggest the deforestation rate in Brazil has declined by 70% in recent months compared to the same period in 2007.

11. Literature Cited


33. Lane, Carol. “All About Forest Carbon Offsets” August 6, 2008. Published by Conservation International at: http://www.conservation.org/FMG/Articles/Pages/dell_forest_carbon_offsets_madagascar.aspx, last visited 02/20/2009


42. Unfccc.int

## Appendix: Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAU</td>
<td>Assigned Allowance Units</td>
</tr>
<tr>
<td>AB 32</td>
<td>Assembly Bill 32: California’s Global Warming Solutions Act</td>
</tr>
<tr>
<td>AFOLU</td>
<td>Agriculture, Forestry and Other Land Use Projects</td>
</tr>
<tr>
<td>ALM</td>
<td>Agriculture Land Management</td>
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<tr>
<td>A/R</td>
<td>Afforestation and Reforestation</td>
</tr>
<tr>
<td>ARR</td>
<td>Afforestation, Reforestation, Re-vegetation</td>
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<td>CARB</td>
<td>California Air Resources Board</td>
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<td>California Climate Action Registry</td>
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<td>Climate, Community, and Biodiversity Alliance</td>
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<td>Climate, Community, and Biodiversity Standards</td>
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<td>Clinton Climate Initiative</td>
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<td>Chicago Climate Exchange</td>
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<td>Clean Development Mechanism</td>
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<tr>
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<td>Clean Development Mechanism Executive Board</td>
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<td>Certified Emission Reduction</td>
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<td>Chlorofluorocarbon</td>
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<td>Carbon Financial Instrument</td>
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<td>CarbonFix Standard</td>
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<td>Methane</td>
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<tr>
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<td>Carbon dioxide</td>
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<td>DNA</td>
<td>Designated National Authority</td>
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<td>ERU</td>
<td>Emission Reduction Unit</td>
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<td>EU-ETS</td>
<td>European Union Emission Trading Scheme</td>
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<td>Forest Carbon Partnership Fund</td>
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<td>Forest Stewardship Council</td>
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<td>GHG</td>
<td>Greenhouse Gases</td>
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<td>GMO</td>
<td>Genetically modified organisms</td>
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<td>HCV</td>
<td>High Conservation Value</td>
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<td>IFM</td>
<td>Improved Forest Management</td>
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<td>Intergovernmental Panel on Climate Change</td>
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<td>Joint Implementation</td>
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<td>Japanese Voluntary Emissions Trading Scheme</td>
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<td>LULUCF</td>
<td>Land Use, Land Use Change and Forestry</td>
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<td>MRP</td>
<td>Midwestern Regional GHG Reduction Program</td>
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<tr>
<td>MtCO₂e</td>
<td>Millions of tons of carbon dioxide equivalent</td>
</tr>
<tr>
<td>NOₓ</td>
<td>Nitrogen oxide</td>
</tr>
<tr>
<td>N₂O</td>
<td>Nitrous oxide</td>
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<td>Not-for-profit Corporation</td>
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<td>Over-the-Counter Market</td>
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<td>PDD</td>
<td>Project Design Document</td>
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<td>Reduced Emissions from Deforestation and Degradation</td>
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<td>Abbreviation</td>
<td>Full Form</td>
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<td>RGGI</td>
<td>Regional Greenhouse Gas Initiative</td>
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<tr>
<td>RMU</td>
<td>Removal Units</td>
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<tr>
<td>tCO2e</td>
<td>Ton of carbon dioxide equivalent</td>
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<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
<tr>
<td>VER</td>
<td>Verified (or Voluntary) Emission Reduction</td>
</tr>
<tr>
<td>VCS</td>
<td>Voluntary Carbon Standard</td>
</tr>
<tr>
<td>VCU</td>
<td>Voluntary Carbon Unit</td>
</tr>
<tr>
<td>WCI</td>
<td>Western Climate Initiative</td>
</tr>
<tr>
<td>WRCAI</td>
<td>Western Regional Climate Change Initiative</td>
</tr>
<tr>
<td>WWF</td>
<td>World Wildlife Fund</td>
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