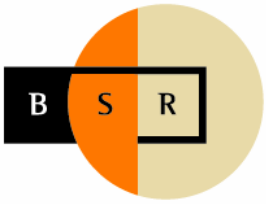

Business for Social Responsibility

Bio-Carbon and Corporate Climate Strategy: A Business Brief on Emissions Reductions Via Forestry and Land Use Projects

November 2007

About This Brief

This business brief explores corporate emissions reductions through bio-carbon initiatives, which offer one of the most important, but complex, activities for reducing global carbon emissions. It builds on "Getting Carbon Offsets Right," (BSR 2007), a report exploring of one of the three main practices in "A Three–Pronged Pronged Approach to Corporate Climate Strategy" (BSR 2006). The brief was written by Ryan Schuchard, Sissel Waage, Ph.D., and Emma Stewart, Ph.D., and reviewed by Toby Janson-Smith of Conservation International, Jonathan Shopley of Carbon Neutral, and Eveline Trines of Treeness Consult. Interviewees included: Josh Bishop (IUCN), Sandra Brown (Winrock International), Keya Chatterjee (WWF), Charles Earheart (CARE), Frank Hicks (Forest Trends), Toby Janson-Smith (Conservation International), Zoe Kant (TNC), Marisa Meizlish (New Forests), Naomi Pena (Pew Center on Global Climate Change), John Rogers (Conservation Fund), Sara Scherr (EcoAgriculture Partners), David Shoch (TNC), Jena Thompson (Conservation Fund), Evelyn Trines (Treeness Consult), and Lou Verchot (ICRAF). Please direct comments or questions to Ryan Schuchard at rschuchard@bsr.org.

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1. Executive Summary

Deforestation and land degradation are responsible for about 20 percent of global carbon emissions,[1] and are therefore a growing focus of international climate policy discussion. Scientists have long pointed to the critical role of land use, land use change and forestry in addressing and mitigating climate change, and discussion about the use of market-based incentives (MBIs) to encourage good practice has been building for some time.

In the last few years, experimentation and investment have grown significantly, particularly in the non-regulated voluntary carbon markets. Although forestry and land use activities only account for approximately 1 percent of the volume of regulated carbon trading schemes,[2] discussion is growing around how to significantly expand this volume.

As companies craft climate change strategies, corporate decision-makers will increasingly encounter the question of whether to invest in carbon sequestration through forestry and land use initiatives (referred to here as bio-carbon initiatives). At present, one of the most popular programs that companies are engaged in involve planting trees. However, fewer businesses have considered the full set of investment options, which include expanding and improving managed forest initiatives, changing land management or agricultural practices to enhance soil carbon sequestration, and addressing deforestation, thus preventing greenhouse gas emissions that occur when forests are cleared.

Our research suggests that failure to consider the full range of options may be a missed opportunity. Forestry and land use carbon projects can be more cost effective than other emissions reductions and offsets. Also, these initiatives can be designed to provide co-benefits related to biodiversity conservation and rural economic development. In addition, engaging in the bio-carbon domain can further corporate social responsibility objectives and strengthen supply chains.

Despite these benefits and the scientific recognition that forest and land management can play important roles in addressing climate change, the Kyoto Protocol and other regulatory carbon markets have thus far focused on less complex emissions reductions options like energy efficiency and industrial gas. However, within the experimental voluntary carbon markets, bio-carbon projects account for more offset transactions than any other project type[3] and protocols are being tested and applied with greater confidence.

Policy discussions about both forestry and land management-related bio-carbon projects are rapidly evolving as the December 2007 United Nations' Conference of the Parties 13 nears. A docket of proposals is being offered to fill the regulatory vacuum in the United States, including national legislation and regional initiatives. At present, three (of seven) key U.S. federal bills for emissions regulation recognize biological sequestration as viable greenhouse gas (GHG) mitigation options.[4]

Amidst the evolving policy discussion, this business brief aims to assist corporate managers in understanding the issues, risks and opportunities associated with bio-carbon investments. Specifically, this brief is intended to catalyze and facilitate conversation within companies about bio-carbon investments in the context of a larger corporate climate strategy.

II. Putting Bio-Carbon in Context: Relevance to Corporate Strategy and Contributions to Climate Change

Companies are developing increasingly sophisticated approaches to managing greenhouse gas (GHG) emissions. In a relatively short amount of time, many businesses have become adept at reducing direct emissions. Pioneers are moving upstream to manage embedded emissions in supply chains and reduce the emissions associated with product use.

Scrutiny of corporate GHG reductions and carbon management is also on the rise. Initially, attention focused on *whether* companies were reducing emissions, but it is fast broadening to examine *how* and *how quickly*. It is not enough to simply make incremental internal reductions and offset the remainder with little oversight. For companies buying carbon offsets, new attention is being devoted to how companies can partner with offset brokers and project developers strategically and create more value.[5]

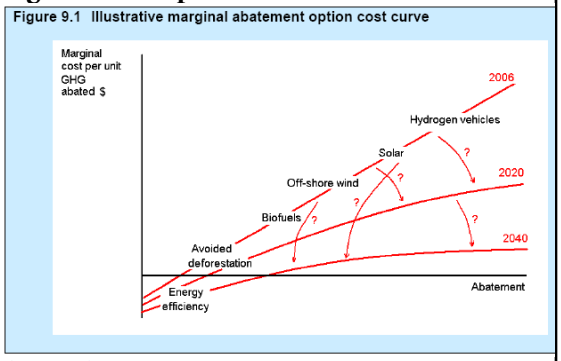
The context of heightened scrutiny means that companies face a continuing challenge in determining the portfolio of offset project types. For example, should companies invest in methane capture from landfills in the United States, industrial gas reductions in China, or reforestation in Indonesia? Should the lowest cost options be pursued across the board? How should companies view potential ancillary community and environmental benefits and costs? Should businesses focus on one project type or diversify broadly?

In asking these questions, corporate managers need comparable information about offset project types. However, at present, some of the most complex and least understood projects are based on sequestration from biological systems (bio-carbon) associated with land use, land use change and forestry activities (see Annex A for additional information on bio-carbon and project types).

A. The Potential of Bio-Carbon

Deforestation and land degradation account for about 20 percent of GHG emissions (estimates range from 18 percent[6] to 25 percent[7]) and a third of GHG emissions induced by humans.[8] Scientists have long asserted that, in addition to increasing energy efficiency and renewable energy, halting tropical deforestation and scaling up agricultural practices that keep carbon in the soil are needed in order to mitigate climate change.[9] Indeed, bio-carbon activities could represent up to 40 percent of Kyoto Protocol emissions targets.[10]

Figure 1: Comparative Abatement Costs



Source: Stern Review Report.

Now, as standards are developed to allow bio-carbon emissions to be counted, owned and traded, the market for bio-carbon is growing. For companies interested in reducing carbon emissions, these bio-carbon projects offer the following potential advantages:

- **Low Cost:** Forestry and land use activities can be among the lowest-cost activities for sequestering carbon and mitigating climate change.[11] As the Stern Report detailed (see Figure 1), avoided deforestation has the potential to be the second most cost-effective approach, rivaled only by energy efficiency.

- **Ecological Infrastructure Investments:** Bio-Carbon projects can play a role in ensuring that continued deforestation does not lead to abrupt, non-linear ecological changes that could unpredictably and dramatically affect natural resources, ecological services or carbon sequestration potential of a given ecosystem.[12] Well-designed bio-carbon projects have the potential to bolster ecosystem resilience as well as create conditions in which adaptation to climate change is more likely to occur.[13] Furthermore, well-designed carbon forestry projects have the potential to protect habitats for threatened species.

- **Clarity of Message and PR Appeal:** The tangible nature of land management-related projects can provide simple and resonant imagery. In addition, associations with forests and natural landscapes can bring brand appeal when targeting certain customer demographics, such, as some companies report, with so-called "LOHAS" (lifestyles of health and sustainability) segments.

- **Co-Benefits:** Bio-Carbon projects hold potential to further sustainable development goals and poverty alleviation. When structured appropriately, land and forest bio-carbon projects can serve as forms of community development with the potential for positive ripple effects that strengthen relationships and stability within supply chains and even consumer markets.

Box 1: Illustrative Bio-Carbon Projects

In Mexico, Scolel Té helps companies offset emissions by investing in agricultural and forestry projects. In partnership with the International Federation of Automobiles, funds have been used to offer small-scale farmers with technical assistance and seedlings to enable switching from swidden agriculture to agroforestry. The project is managed by the Edinburgh Centre for Carbon Management and a co-operative of foresters and agronomists in Mexico (AMBIO).

In Brazil, the American Electric Power Corporation, Chevron and General Motors have paid $18.4 million for climate credits with the Guaraqueçaba Climate Action Project (GCAP). The GCAP has sought to regenerate and restore natural forest and pastureland. It sells carbon emission offset credits for the 8.4 million metric tons of carbon dioxide the restoration project is expected to sequester in its lifetime.

In Uganda, Tetrapak has paid individual farmers to plant indigenous tree species through a purchase of about $100,000 worth of carbon emissions credits. The payments are channeled through an international carbon broker and a Ugandan national conservation trust. Thus far, over 100 farmers have been paid to participate.

In Southwest China, NAVTEQ has invested over $100,000 in the Tengchong community-based forest restoration project being developed by Conservation International and The Nature Conservancy. This project was the first to be certified with the Climate, Community & Biodiversity Standards and the first small-scale forestry project validated under the Kyoto Protocol's Clean Development Mechanism (CDM).

In Australia, Rio Tinto Aluminum is working with Carbon Pool on a forest project aiming to preserve 30,000 hectares of high conservation value woodland and forest area and generate in excess of 2 million tons of verified emission abatement credits.

Sources: Ecosystem Marketplace, BSR, Rio Tinto and CCBA.

B. The Limitations of Bio-Carbon

Despite these benefits and the recognition that deforestation can play an important role in addressing climate change, the Kyoto Protocol and other regulatory markets currently focus on framing less complex emissions reductions options (e.g. energy efficiency and industrial gas). In turn, the acceptance of forest-related projects within the Kyoto Protocol's Clean Development Mechanism (CDM) remains governed by a complex set of requirements for standards, implementation and verification,[14] with the bulk of bio-carbon projects not allowed. The result is that forestry projects currently account for a tiny portion of CDM projects. But within the more experimental voluntary carbon market, in contrast, forest carbon projects account for more offset transactions than any other project type.[15]

As forestry and land use carbon projects have emerged within both regulated and voluntary carbon markets, so too have critics. These critics claim that if bio-carbon projects are designed poorly — such as forest projects that plant non-native species in monocultures — they may potentially alter ecosystems, disrupt water flows and adversely affect rural economies. This scrutiny has meant that doing due diligence in assessing partners and projects is essential.

C. Three Emerging Schools of Thought on Bio-Carbon

The following are three basic schools of thought about the future of bio-carbon:

1. After years of development and voluntary market experimentation, we now have the tools to commoditize forest and land use-related carbon …we just need the will.

Advocates assert that institutions exist to make bio-carbon emissions reductions a tradable commodity and in turn a critical resource for addressing and mitigating climate change. According to this thinking, we now need to disseminate best practices, scale up efforts and expand the market.[16]

2. Bio-carbon activities should be dealt with cautiously. There is too much uncertainty now to move quickly.

In order for bio-carbon activities to be effective and sustainable, some argue that we need to first develop a more shared understanding of how to address measurement, management, implementation and unintended adverse effects, both within particular ecosystems and in other regions that may experience ripple effects. While bio-carbon trading may have important applications, it is argued that potential negative effects need to be considered and weighed carefully against alternative approaches.

3. Bio-carbon projects are too problematic and should not be considered as part of the global climate change mitigation strategy.

Others assert that while we clearly need to protect natural carbon sinks, bio-carbon projects currently fail to address the real challenges and create pressures that may likely harm biodiversity and local communities. In this line of thinking, market-based incentives are not effective replacements for proper regulation.

The debate about the role of bio-carbon within broader efforts to address climate change is currently very active, particularly as the December 2007 United Nations' Conference of the Parties 13 in Bali, Indonesia, approaches. A docket of proposals is being offered to fill the regulatory vacuum in the United States, including regional initiatives (e.g. the Western Climate Initiative and Regional Greenhouse Gas Initiative) and national legislation. At present, three (of seven) key U.S. federal bills for emissions regulation recognize biological sequestration as viable GHG mitigation options.[17]

A recent World Bank report concluded that mobilizing finance for bio-carbon offers "an ungrasped opportunity for mitigating climate change, supporting sustainable land use, and conserving forests."[18] This assertion summarizes an increasingly mainstream view of economists and policy makers focused on the emergent carbon market trading schemes. As a result, debates around how bio-carbon will play within future regulatory carbon markets are likely to build in the coming months.

As such, it is becoming increasingly important that corporate decision-makers explore whether or not to develop a point of view and policy position on bio-carbon within the broader context of corporate climate strategy.

III. The Regulatory and Voluntary Carbon Market Landscape

Carbon markets transform emissions reductions into tradable economic instruments and are intended to: (1) create a price to charge emitters, (2) provide incentives encouraging continual improvement for innovators and entrepreneurs, and (3) harness market forces to move projects to their lowest-cost locations. In order for this to work, rules need to be developed which define ownership and create scarcity and fungibility, key properties of commodity markets. Two different frameworks exist for engaging in carbon markets. First, regulated (or compliance) schemes are mandated by governments. Second, unregulated voluntary markets are established with rules defined by voluntary standards and in which participants choose partners based, in part, on their reputation.

Within regulatory markets, trading emissions reductions from bio-carbon was recognized as one of the first potential project types. However, it was quickly seen that the technical complexities of measuring species and site variability coupled with the realities of managing forest operations on the ground presented serious challenges to developing effective projects. The net result has been that, to date, regulated markets have allowed only a small subset of potential bio-carbon project types. Among these permitted project types, bureaucratic complexity combined with limited access have led to high transaction costs.[19] Therefore, bio-carbon volume within regulatory markets has been very small, representing only 1 percent of $30 billion in volume and approximately 1,600 metric tons carbon dioxide equivalent ($MTCO_2e$).[20] By mid-2007, bio-carbon projects accounted for only one of the 500 CDM projects.[21]

Within voluntary carbon markets, however, bio-carbon commands much larger and more diverse activity. For example, forestry projects include 36 percent of the $55 million non-regulated, over-the-counter (OTC) transactions, which account for 13.4 $MTCO_2e$. This growth of bio-carbon within voluntary markets is linked with the reality that voluntary market standards are less prescriptive than regulatory schemes. Forestry projects that do not meet compliance criteria are allowed — often at a low cost. In addition, voluntary markets offer new, experimental approaches that may be attractive investments.

Demand for bio-carbon is also a factor. In regions such as the United States, bio-carbon (particularly related to forestry) is not only accepted in voluntary markets, but frequently preferred. Two-thirds of projects registered on the U.S. Chicago Climate Exchange are related to agricultural soil and forestry,[22] and two-thirds of bio-carbon on the California Climate Action Registry are based in the U.S.[23] The importance of bio-carbon within the California Climate Action Registry is well expressed through the acceptance of a forestry protocol as the first approved protocol.[24] In Europe, especially the United Kingdom, forestry is less favored, but land management and soil-related carbon are gaining in interest. (See Figures 2 and 3 for a summary of bio-carbon within both regulated and voluntary markets and Table 1 for a summary of the current carbon markets and types of bio-carbon projects included in each.)

Figures 2 and 3: Bio-Carbon Transactions in 2006

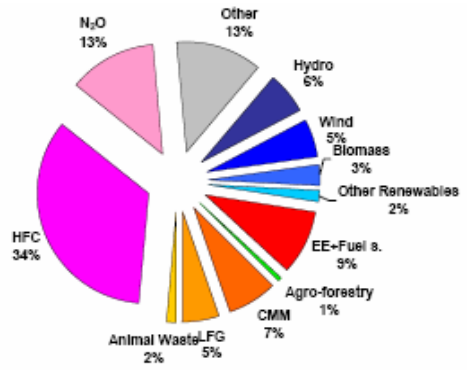
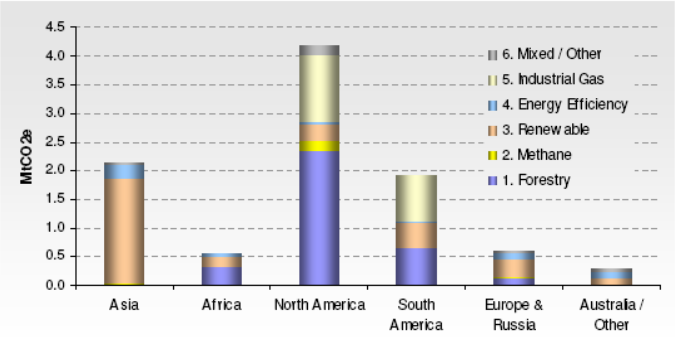
Regulated Market (CDM)	Voluntary Markets
	
Source: World Bank.	*Source: Ecosystem Marketplace and New Carbon Finance.*

Table 1: Summary of Bio-Carbon within Carbon Markets

Exchange	Bio-Carbon Project Types	Project Quality Standards*
Regulated Markets		
EU Emissions Trading Scheme (EU ETS)	• None included	• Not applicable
Clean Development Mechanism (CDM)	• Afforestation and reforestation	• CDM Methodologies for afforestation and reforestation CDM project activities
Joint Implementation (JI)	• Afforestation and reforestation	• JI National guidelines and procedures
New South Wales Greenhouse Gas Abatement Scheme (GGAS)	• Afforestation and reforestation (local only)	• GGAS Carbon Sequestration Rule
Alberta Offset System	• Afforestation (local only) • Tillage system management (local only)	• Approved Alberta Protocols under the Specified Gas Emitters Regulation
Hybrid Regulated Markets Candidates for regulatory schemes and/or legally-enforced		
Chicago Climate Exchange (CCX)	• Forestation and forest enrichment • Combined forestation and forest conservation • Urban tree planting • Agricultural soil carbon • Rangeland soil carbon	• CCX Offset Project Registration, Verification & Crediting Procedure
Regional Greenhouse Gas Initiative (RGGI)**	• Afforestation	• Under development
Western Climate Initiative (WCI)**	• To be determined	• Under development, with CCAR Forestry Protocols and SB 812 as candidates
Japan Voluntary Emissions Trading Scheme (JVETS)	• None	• Not applicable
Voluntary Markets		
Over the Counter (OTC)	Unrestricted, with common project types including: • Forestation (including afforestation and reforestation) • Avoided deforestation • Forest management • Land management (including revegetation, cropland and grazing land management) Experimental technologies (such as algae, biochar soil, plantkton and soil ionization)	• VCS • Climate, Community & Biodiversity Standards (CCBS) • Plan Vivo • Social Carbon • The Georgia Carbon Sequestration Registry Project Protocol • Retail Greenhouse Gas Reduction Product Certification Program Standard

** Standards that do not include bio-carbon include Gold Standard VER.*
*** Under development.*

Advocacy is sharply on the rise to include more bio-carbon in future regulatory schemes. Many advocates assert that an increasing number of tools, protocols and approaches address issues of complexity and cost in measurement and monitoring. Proponents also argue that other concerns levied on bio-carbon projects, such as whether projects are "additional" to business as usual (i.e. would not have occurred without offset project financing) are not exclusive to bio-carbon and plague other types of emissions reductions projects.

Overall, the state of bio-carbon within voluntary markets is robust and likely to grow, especially in land management and soil carbon. In terms of future regulatory carbon markets, the debate is underway and results remain unclear. For corporate decision-makers, it may be well advised to follow these discussions in order to track developments that could inform and affect corporate climate strategy.

IV. Key Issues: Carbon Sequestration, Biodiversity Conservation and Sustainable Development

While carbon sequestered in forests and soils can play a key role in addressing climate change, land uses are also inextricably intertwined with broader dynamics related to economic opportunities and well-being of rural resource-dependent communities. Land use decisions also affect the structure and function of ecosystems on which people rely for predictable flows of water and many other ecological services. Thus, forests and land use play a role in addressing not only climate change, but also environmental protection and sustainable development. Multiple concerns are linked and often co-dependent when forest and soil carbon sequestration are considered.

In response to these dynamics, nongovernmental organizations (NGO) and policy dialogues consist of essentially three interdependent key issues concerning bio-carbon.

A. Key Issue #1: Carbon Sequestration

As with all carbon projects, it is important to demonstrate that bio-carbon projects are additional, real, measurable, durable (or permanent), verifiable, enforceable and synchronous.[25] Bio-carbon projects require detailed design work that takes into consideration differences between tree species, soils, regional climates, topography and land use practices.[26]

Today, the key carbon sequestration-related issues associated with bio-carbon projects include the following:

- **Additionality**, which establishes that the project would not have happened without carbon financing. In other words, the carbon sequestered is "additional" to business as usual. In determining the baseline for "business as usual," bio-carbon projects are complicated by the need to account for varying rates of sequestration over time because of differences in species, site characteristics and other parameters. A need to clarify ownership of the reduction in which both the owner and operator may have a stake may also exist. Demonstrating additionality is subject to more discussion with avoided deforestation than other forest management projects. To address these challenges, remote sensing and new approaches to governance and management are being explored.[27]

- **Leakage** is the unanticipated change in carbon emitted (or sequestered) outside of project sites.[28] In the case of forest and land management projects, leakage can occur when carbon sequestration-related practices at one project site contribute to pressures to act in ways that release carbon in other areas. While it is complex to assess the multivariate dynamics in these cases, an increasing set of approaches are being used to address leakage issues. These include: (1) proposals to shift from a project-to-project focus to national-level accounting, and (2) efforts to put in place preventative measures in high-risk areas, such as in highly forested countries with low deforestation rates that may increase if forest management is diminished in other regions.[29]

- **Durability** (or permanence) is the ability of projects to maintain carbon sequestration benefits throughout their intended lifespans. This requirement of bio-carbon projects is complex not only because of potential changes within human-induced factors (such as timber harvesting and agricultural/land use practices that release soil carbon), but also in terms of natural dynamics (such as wildfires). In response, the Kyoto Protocol has created a distinction between temporary credits (tCERs) and long-term credits (lCERs), which enables the accounting systems to address this durability issue. Within voluntary markets, this issue of permanence is one worth careful consideration. As time periods lengthen, it is difficult to guarantee that fires, expropriation of trees, changes in land use or other activities will not damage the integrity of projects. Such shifts may particularly become attractive as climate change alters rainfall patterns and the value of lands for food or even biofuel production shifts over time. In response, a number of contractual and financial instruments are being developed that combine creative rental agreements, partially fungible temporary credits and traditional risk management.[30]

B. Key Issue #2: Biodiversity Conservation

Careful design of bio-carbon projects is essential, particularly to ensure biodiversity and habitat are not adversely affected, and that local ecological services of flood control, water quality and other such co-benefits continue to exist.[31] The challenge for project designers — and the important element in due diligence for corporate "buyers" as well as "sellers" — is to understand the biodiversity-related context in terms of what exists in an area and what threats are undercutting biodiversity in that region.

Box 2:
Illustrative Co-Benefits from Bio-Carbon Projects

In the Noel Kempff National Park in *Bolivia*, the Nature Conservancy is partnering with the government, Fundación Amigos de la Naturaleza and three U.S. energy companies to mitigate up to 17.8 million tons of emissions (in 30 years) through avoided logging and agricultural conversion, and in turn protect 1.5 million acres of one of the most biologically diverse areas in the world.

In Yunnan, China, a small-scale "Reforestation for Landscape Restoration" project aims to both sequester carbon and also create employment for about 2,000 people. The CDM project is CCBA-certified.

In *Nicaragua,* a project led by Carbon Fund and Paso Pacifico has among its goals biodiversity preservation, strengthening private reserves, and development of sustainable eco-tourism and alternative agriculture.

In the Rio Bravo Conservation and Management Area in Belize, the Nature Conservancy is mitigating 8.8 tons of carbon (over 40 years) by conserving and improving management of over 150,000 acres of rainforest, while conserving biodiversity and creating jobs. The project is certified by FSC, SmartWood and Woodmark.

Sources: The Nature Conservancy, CCBA, and Carbonfund.

In terms of design of particular projects, it is essential to engage with partners who have track records of showing projects that have proven biodiversity habitat co-benefits. For forest carbon projects, for example, selection and use of various tree species are neither equal in terms of amount of carbon stored nor ecological attributes across all settings. Key variables often change based on where the project is sited, what management practices are applied, and what spatial and temporal scales are

considered. Ecological expertise is essential for ensuring biodiversity co-benefits. Also, site-specific knowledge of ecological dynamics related to the maintenance of ecosystem services over time, including ensuring biodiversity, is needed.

Several frameworks have been developed to assist companies in thinking through these issues. The most prominent is the Climate, Community & Biodiversity Standards (CCBS) currently being used by over 50 projects around the world. In addition, Plan Vivo offers projects that consider multiple factors in bio-carbon. Finally, the Forest Stewardship Council (FSC), while not explicitly addressing carbon sequestration, has been used in conjunction with the CDM projects as another way to assure community and biodiversity issues.

The co-benefits that accrue from well-designed bio-carbon projects that consider biodiversity and community factors offer not only PR value, but also the potential for assisting rural resource-dependent communities to live in environments that are more resilient to climatic changes. Simply put, the more simplified the ecosystem, the less biodiversity exists (relative to previous states), and the more "brittle" it tends to be. Significantly impacted ecosystems are more apt to fundamental change when faced with shifts in rainfall or other key parameters. Robust and resilient ecosystems (and high levels of biodiversity) play a role in maintaining stable societies, securing food and addressing poverty.[32]

C. Key Issue #3: Sustainable Development

With 70 percent of the world's poor living in rural areas,[33] 4.5 billion people depending on forests for water, and 1.3 billion people employed by agriculture,[34] the emergence of markets for positive environmental practices within forests and rural lands holds enormous potential for sustainable development. Attracting investment in bio-carbon represents a potential boon for rural livelihoods. This opportunity was a key component of the CDM vision. Indeed, a number of projects with explicit sustainable development objectives are already under way (see Box 2).

Implementation in the past years has, however, demonstrated the challenges and work that needs to be done to match vision with practice. Bio-Carbon projects have been alleged to induce serious social problems, including evictions of forest dwellers in Mt. Elgon, Uganda,[35] and coercion of people into unfair contracts in Ecuador.[36] Although details are disputed, these examples symbolize potential difficulties associated with bio-carbon projects, particularly where governance is weak.[37] Among other possible problems, bio-carbon projects have been alleged to violate customary land rights and lead to inequality, fraud and conflicts.[38] The Indigenous Forum on Climate Change objects to the Intergovernmental Panel on Climate Change's (IPCC) definitions outright and maintains that emissions trading threatens their culture and sovereignty.[39]

When considering bio-carbon projects, it is essential to recognize that land and forest management need to serve many people and provide multiple benefits. Bio-carbon projects that neglect to consider the pressures that local communities and others face are likely to encounter significant difficulties or even failure over their long timeframes.

For corporate decision-makers, the key will be in investing in or creating bio-carbon projects that have been designed by reputable partners with track records that show inclusion of not only carbon sequestration issues, but also, at the very least, sensitivity to biodiversity and sustainable development concerns. These elements are increasingly being pulled together through various emerging standards and projects, such as those by the Climate, Community and Biodiversity Project Design Standards (CCB Standards) and in Plan Vivo projects.

V. Recommendations for Businesses

Recommendation #1: Assess the Attractiveness of Emissions Reductions from Bio-Carbon.
Carbon has the potential to become a major cost driver — on the order of $40-$50 per ton of emissions. Reduction projects, therefore, represent significant opportunities. Given the considerations described in this brief, corporate decision-makers would be wise to consider the attractiveness of cost-efficient bio-carbon projects relative to other options for their company. The following benefits and costs are most common to consider in terms of bio-carbon assessments:

Benefits	Costs
• **Low Cost.** Theoretically, bio-carbon offers one of the lowest-cost investment opportunities for making reductions. Yet in practice, the emergent nature of the market can create high transaction costs and risks. Within this context, entrepreneurs and innovators may be able to package deals and lock in forward contracts that are extremely attractive. • **Diversification.** While reducing emissions is an increasingly important corporate objective, there remains vibrant discussion of pros and cons in terms of various types of emission reduction and sequestration projects. Based on the assertion of scientists that addressing bio-carbon sequestration is an important component of the climate change policy solutions, holding investments in this sector may be important in the coming years for diversifying emissions reductions investments. • **Supply Chain and Marketing Synergies.** Forests and soils offer a host of benefits beyond simply sequestering carbon, which include timber and biodiversity, reliable flows of water and other ecosystems services, and the basis for community livelihoods. By developing bio-carbon projects that generate multiple benefits, companies can enhance landscapes and strengthen supply networks, improve customer loyalty and stakeholder relations, build brands and create new product lines.	• **Market Challenges and Transaction Costs.** The relative newness of carbon trading means that markets can be illiquid, disjointed and opaque, all of which are often true for bio-carbon. Corporate decision-makers therefore would be wise to ensure adequate expertise and exploration of full costs associated with bio-carbon projects. • **Political Risk.** Both significant deforestation, as well as low-cost potential abatement, occurs in tropical developing countries. Bio-carbon investments in these countries, however, can come with risk, particularly related to maintaining projects over time. Companies may address this risk in various ways, including through careful project design, political risk insurance and transferring risk to other parties. • **Reputation Risk.** Public opinion on bio-carbon projects has cycled over time and is distinct from region to region (such as the more positive view of forest-carbon in the United States relative to Europe). Given the complexity of bio-carbon projects, it is essential to ensure strong partners and well designed projects based on respected standards.

Recommendation #2: Experiment with Bio-Carbon Transactions.
The next two years will be a particularly good time to experiment with bio-carbon transactions. Corporate decision-makers should consider the following opportunities and risks of four types of non-mutually exclusive deals:

- **Making Reductions** by originating projects either: (1) on corporate-owned lands that are under management practices showing a shift from "business as usual" and that adhere to other key

elements of bio-carbon projects; or (2) by investing in projects that originate bio-carbon offsets elsewhere.

- **Buying Reductions** in the regulated or voluntary markets, either for use as part of a corporate emission reduction portfolio or to further package and sell.
- **Selling Reductions** through regulated or voluntary markets, which would generally be done by project developers or intermediaries.
- **Using Reductions** by retiring and applying them to the company's emissions reductions targets.

The following are important lessons for managing risk in such experiments:

1. Ensure deals are structured so that all stakeholders have incentives to it make work. Remember that while bio-carbon is a subset of the carbon market, issues related to biodiversity conservation and local community development can create non-market pressures, particularly by NGOs and rural community members who live near project sites.

2. Choose partners wisely. Select project development partners who have track records of strong projects as well as proven, cost-effective methodologies for carbon sequestration. Ask for references from previous clients and ask direct questions such as:

- How long has the organization been around?
- How long has the organization been involved in forestry issues?
- What projects have been implemented?
- What criticism has been received?
- What philosophies and approaches exist to address key issues, such as additionality, leakage and durability?

For more information on prospective partners, please see Annex B for a list of bio-carbon developers, aggregators and providers.

3. Mitigate risk by combining robust standards, such as the Kyoto Protocol's Clean Development Mechanism with the CCB Standards and FSC standards. Participating in a carbon registry is also a good idea.

Recommendation #3: Plan for the Emerging Bio-Carbon Political Economy.
Irrespective of your company's decision to transact in bio-carbon today, understand bio-carbon issues in order to be responsive to the evolving set of discussions and expectations related to corporate climate strategies in the future. The following types of companies and their peers may be particularly impacted as bio-carbon policy discussions mature:

- **Large landowners:** Companies that own land have significant potential carbon assets and liabilities, many of which are only now being understood and discussed in terms of financial value. The opportunity of becoming a "seller" of bio-carbon is most likely to exist for companies in agriculture, extractives and real estate.
- **Significant emitters:** Companies with emissions-intensive or large absolute footprints are likely to face pressure to make cost-effective, reliable reductions. Bio-carbon projects may offer both

cost-effective offset methods as well as diversification approaches to securing these reductions at scale.

- **High-profile companies:** As with significant emitters, well-known corporations and brands should consider their emissions reduction portfolios carefully. As some companies have already learned, trading bio-carbon and making claims without due diligence can harm their reputations. If designed properly, however, bio-carbon can: (a) be attractive from a carbon perspective; (b) have the potential to concurrently support key supply chain regions; and (c) be associated with compelling multiple benefits such as biodiversity conservation and poverty alleviation.
- **Finance and brokerage institutions:** Carbon trading, valued at over $90 billion in voluntary markets alone,[40] represents the emergence of a new type of commodity defined by environmental attributes. Volume is forecasted to grow significantly and it is possible that related asset classes could emerge. As finance and environmental management converge, intermediaries — whether banks, brokers or NGOs — will play new and important roles within the bio-carbon domain.

With current deforestation rates, very limited time exists in which to take advantage of many of the highest-value forest conservation opportunities. Once these forests are harvested, it will be far more expensive and difficult to restore the lost carbon through forest restoration activities than protecting it in the first place. Advocates increasingly assert that the scientific and economic knowledge now exists to effectively manage the sequestration aspects of bio-carbon.[41] In light of these developments, it is likely that bio-carbon will only increase as a class of investments within broader carbon markets, both regulatory and voluntary.

Recommendation #4: Track the Following Unresolved Debates.

Will agreement be reached on carbon provisioning for "avoided deforestation"? Regulated markets currently allow only forestation, just one of the five bio-carbon classes outlined in this report (see Annex A). As policy develops, a key issue is whether avoided deforestation will be included. This is a critical issue for projects that would have similar carbon effects as forestation, but presents complex operational challenges (see Box 3 for selected action plans).

What scales of action should be focused upon (e.g. national vs. project level) and what should be the role of forestry standards versus institutional and government-focused approaches? There is opportunity for forestry projects to combine climate mitigation activities with biodiversity conservation and sustainable development frameworks.[42] Noting the importance of understanding forests as living systems, some experts interpret this issue as underscoring the need to integrate biodiversity and sustainable development standards into project protocols. Others note that forests are so dramatically different around the world, including distinct deforestation pressures, varying extent and depth of poverty, and unique environmental consequences of forest conversion,[43] that most decision-making should

Box 3:
Selected Proposed "Action Plans" for Linking Avoided Deforestation with Carbon Markets

Perspectives on the opportunities and challenges of linking carbon markets with initiatives for Reducing Emissions from Deforestation and Degradation (REDD) are diverse and include:

- "The Way Forward" (GTZ)
- "The Dual Markets Approach" (CCAP)
- "Compensated Reduction" (EDF)
- "Seeing Red" (Forest Peoples Program)
- "Establishing Credible Baselines for Quantifying Avoided Carbon Emissions…" (Duke University)

reside among local institutions, many of which need greater capacity and resources. The issues of scales of action (national-level forestry approaches versus project by project, or any other scale along the spectrum) and actors within such a context are still very much in discussion.

How will regulated markets take shape and address bio-carbon in the United States and Australia? Until the United States adopts a domestic GHG reduction program, there are a number of questions that are simply unanswered. One is how regulations will be targeted "upstream" or "downstream," and how burdens will be shared between organizations and states. Another question is how other incentives such as taxes, product standards and technology subsidies will supplement carbon trading. Finally, and critically, although bio-carbon transactions are growing in the United States and Australia, it is not known how or if they will be accepted under regulation.

How will competing land use interests be considered? Calculating the value of bio-carbon depends on the opportunity cost of not doing something else, such as growing crops (in ways that release soil carbon). Complicating traditional commodity prices is the rise of biofuels, which, depending on the feedstock, conversion process and other variables may result in more emissions. Incentives for these and other agricultural commodities will affect engagement and compliance with the terms of bio-carbon agreements over time. Therefore, corporate decision-makers would do well to consider its own biofuel and agricultural policies in relation to its corporate climate strategy and bio-carbon stances in order to ensure consistency across positions and policy stances.

Recommendation #5: Engage in Discussions About the Rules and Incentives Related to Bio-Carbon.

A final key opportunity is to play an active role in the shaping of rules and incentives for bio-carbon. Many topics, such as the role of avoided deforestation, are still being decided in regulatory markets. Opportunities for engagement include the following:

- **Participating in pilot programs**, such as the World Bank's Forest Carbon Partnership Facility
- **Partnering on research and publications** with leading experts
- **Advocating for bio-carbon policy**, on both domestic and international levels

Finally, companies should consider how to reduce costs and risks, such as by acting collectively. For example, by involving NGOs through partnerships, corporate decision-makers can help to distill and understand critical issues, thereby decreasing costs of assessing engagement in the bio-carbon domain.

VI. Annex

A: Bio-Carbon Basics

Bio-Carbon refers to the carbon sequestered and stored in the world's plants, soils and oceans. It is being rapidly released into the atmosphere, triggered by an unprecedented rate of deforestation and land degradation,[44] resulting in 20 percent (8 Gt/year) of greenhouse-gas emissions.[45]

Addressing bio-carbon emissions may be a cost-effective approach to reducing emissions.[46] Following are key activities (generally referred to in UN parlance as Land Use, Land-Use Change and Forestry –"LULUCF" projects) that return carbon to earth and potentially create emissions credits:

1. Forestation
Forestation, or the planting of trees, helps grow forests, which account for 80 percent of the carbon dioxide exchanged between the land and atmosphere.[47] There are two subsets: (1) Afforestation (planting trees where they did not recently exist) and (2) Reforestation (planting trees where they recently did exist). Forestation is the most well-known, easiest to measure and monitor, and most accepted among regulatory schemes of all bio-carbon classes.

2. Avoided deforestation
Nearly half of the planet's forest cover has disappeared,[48] with deforestation contributing to fully 87 percent of land emissions.[49] Avoided deforestation (AD), or forest conservation, is the effort to intervene, and research has shown it could yield reductions for as little as $1-5 per ton.[50] Many AD projects are being developed under the guise of "reduced emissions from deforestation and degradation" (REDD), but there is robust debate about how to address leakage and permanence. AD projects are not yet allowed in any regulated market.

3. Forest management
In addition to trees, the understory vegetation, forest floors, downed dead wood and organic soil in forests all work together to sequester carbon. Forest management aims to increase the productivity of this sequestration.

4. Land management
Beyond forests technically defined, open-space soil sequesters large amounts of carbon, with 50 percent to 66 percent of historic carbon loss attributed to agricultural and degraded soil.[51] Three common land management projects types include revegetation, cropland management and grazing land management. In addition, some activities focus on reducing emissions from nitrous oxide and methane.

5. Experimental applications
Finally, research is being conducted on several promising bio-carbon areas, including enhancing biochar in soil, growing plankton and algae, and increasing ionization of the oceans. Currently, such applications are small-scale and much scientific work remains to be done.

B: Bio-Carbon Developers, Aggregators and Providers

Following are prominent bio-carbon developers, aggregators and providers. In considering partnerships with these and other carbon offsets suppliers, companies are advised to consult "Getting Carbon Offsets Right: A Business Brief on Engaging Offset Providers" (BSR 2007).

3Degrees
Ag Business Solutions LLC
AgCert
AgraGate Climate Credits
Arreon Carbon UK Ltd
Atmosfair
Avoided Deforestation Partners
Beartooth Capital Partners LLC
Beijing Shenwu Thermal Energy Trading Co. Ltd.
BGC Brokers LP
BioClimate
Black River Commodity Energy
Blue Source
Bosque Sustentable
C-Green Aggregator Ltd.
Carbon Balanced (WLT)
Carbon Clear
Carbon Farmers LLC
Carbon Footprint
Carbon Green LLC
Carbon Market Solutions Ltd.
Carbon Pool
Carbon Planet
Carbon Resource Management
Carbon-TF B.V.
Carbonfund.org
CarbonVentures
Cargill, Inc
China Energy Conservation and Environmental Protection Technology Investment Ltd.
Climate Care
Climate Focus
Climate Neutral Group
Climate Stewards
Climate Trust
Climate Wedge
CNX Gas Corporation
CO2 Australia
CO2OL-U.S.A
co2balance.com
CommonWealth Resource Management Corp.
Community Energy Inc.
Conservation International
Conservation Services Group
Delta P2/E2 Center LLC
Ducks Unlimited
East Central Solid Waste Commission
Eco-nomics Incorporated
Ecology and Environment Inc.
Econergy International
Ecoreturm LLP
EcoSecurities
Ecosecurities Capital Ltd.
Emergent Ventures India
Environmental Carbon Credit
Environmental Credit Corp.
Environmental-Synergy
ERA Ecosystem Restoration Associates
FC Stone, LLC
First Capitol Risk Management LLC
Flatlander Environmental
FORECON EcoMarket Solutions
Foretell Business Solutions LLC
Futuro Forestal
Gallo Cattle Company
Genesis Analytics
Geosyntec Consultants Inc
Granger Holdings LLC
Greater Lebanon Refuse Authority
Greenfleet
Greenhouse Balanced
Greenoxx Global
Grey K Environmental Offshore
Grey K Trading Limited
Growaforest
GT Environmental Finance
Heath & Associates, Inc.
Highland Energy, Inc.
Hubei Sanhuan Development Corporation
Impatto Zero
Intrepid Technologies, Inc.
James Jay Castino
Kentucky Corn Growers Association
LandGas Technology LLC
Liaoning Negfa Weiye Pipe Network Construction & Operation Co. Ltd.
Love Trees
Lugar Stock Farm
Madhya Pradesh Rural Livelihoods Program
MGM International
Microgy, INC
MMA Renewable Ventures
Moor Trees
Mountain Association for Community Economic Development
MyClimate (The Climate Protection Partnership
Nagaya Forest Restoration Ltd.
National Carbon Offset Coalition
Nature Conservancy
Native Energy
Natsource
New Forests
North Dakota Farmers Union Offsetters
Pacific Northwest Direct Seed Association
Phase 3 Developments & Investments
Plan Vivo
Precious Woods Holding, Ltd
Prima Klima
Pure - the Clean Planet Trust
RCM International LLC
Reforest the Tropics
Rice Dairy LLC
Rivanna Solid Waste Authority
Sexton Energy LLC
SKG Sanga
South Pole, Ltd.
Southeast Carbon Management
Standard Carbon LLC
Sterling Planet
Sustainable Forestry Management Ltd.
Tatanka Resources LLC
Tennessee Timber Consultants Inc
TerraCarbon
Terrapass
The Andhyodaya
The Carbon Credit Company
The CarbonNeutral Company
The Climate Trust
The Conservation Fund
The Pacific Forest Trust
The Trust for the Public Land
Treebanking Inc.
Treeflights.com
Trexler Climate + Energy Services
Vessels Coal Gas Inc.
Weber County
Woodland Trust
World Bank Bio-Carbon Fund
Xi'an Zhongyang Electric
Zerofootprint

VII. Endnotes

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