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The Role for Sustainably Managed Forests in Climate Change Mitigation

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Abstract:

The United States (U.S.) has not ratified the Kyoto Protocol, restricting the ability of forests from participating internationally as greenhouse gas (GHG) emission offset projects. As a result, a proliferation of different Registry and program rules is occurring in the U.S., providing an opportunity for the U.S. forestry community to mitigate GHG emissions. This paper addresses the Kyoto Protocol principles of additionality, permanence, and leakage, and challenges the way that these principles are being used to qualify forest offset projects as climate change mitigation measures. Policy initiatives are proposed for challenging policy makers and the forestry community to rethink sustainably managed forest offset project rules as the U.S. considers GHG emission reduction legislation.

Introduction

As the U.S. considers GHG emission reduction legislation, the forestry community needs to promote all forestry practices that can provide climate change mitigation benefits. Two key policy objectives that the forestry community and policy makers should consider include: (1) keeping forests in forests, and (2) sequestering more carbon through sustainable forest management. Current definitions for the key Kyoto Protocol (UNFCCC, 2007 a)[1] principles of additionality, permanence, and leakage were developed to address emission reduction for direct emitters of carbon dioxide (CO_2) and are not wholly appropriate to the role of forests as carbon offsets for mitigating climate change. Policy initiatives[2] that support these objectives have been suggested that should challenge policy makers and the U.S. forestry community to rethink sustainably managed forest offset project rules.

[1] The United Nations Framework Convention on Climate Change (UNFCCC) required periodic meetings of the Convention's Parties (COP). The Kyoto Protocol (a treaty within the UNFCCC) was adopted at the COP 3 meeting in Kyoto, Japan, on 11 December 1997. The United States signed the Kyoto Protocol on December 11, 1998 but has not ratified (agreed to be bound to) its Articles.

[2] The policy initiatives provided in this paper are the collective contribution of the co-authors. Although the co-authors are in full support of supporting the role of managed forests as climate change mitigation measures, we may not agree fully on the specifics of these policy initiatives.

Anthropogenic changes in the earth's climate have been the focus of climate change policy since the signing of the United National Framework Convention on Climate Change (UNFCCC) at the 1992 Earth Summit. To date, this Convention has been ratified by 191 countries, including the United States (UNFCCC, 2007 b)[3].

The objective of the UNFCCC was to stabilize greenhouse gas emissions, "…at a level that would prevent dangerous anthropogenic interference with the climate system". A global carbon market has emerged as a result of the Kyoto Protocol (of the UNFCCC) which set GHG emission limitations for ratifying nations and established mechanisms for reducing overall GHG by at least 5 percent below 1990 levels by the end of 2012. Article 3 of the Kyoto Protocol introduced concepts of GHG emissions by sources and removals by sinks, but regarding changes resulting from land use change and forestry, it limited the role of forestry to afforestation, reforestation, and deforestation activities conducted since 1990. In November 2001, UNFCCC meetings known as the Marrakesh Accord provided definitions for these forestry activities and introduced forest management (UNFCCC, 2002). The Kyoto Protocol went into effect in February 2005 after being ratified by all industrialized countries except Australia and the United States. The fact that the U.S. has not adopted the Kyoto Protocol opens the door for a more comprehensive view of forests and their role in carbon sequestration in U.S. Registries[4] and programs.

Forests play a significant role in offsetting CO_2 emissions, the primary anthropogenic greenhouse gas (GHG). Trees remove CO_2 from the atmosphere and convert (sequester) carbon as wood. Forests in the U.S. alone sequester about 200 million metric tons of carbon each year (Heath and Smith, 2004), offsetting about 10% of annual U.S. emissions from burning fossil fuels (Birdsey et al. 2006). Meanwhile, deforestation worldwide contributes 18% of all CO_2 emissions (Stern, 2006).

Globally, forests have been restricted to only afforestation projects, and represent only 1 percent of the 2006 traded volumes (Capoor and Ambrosi, 2007). To-date, only ten afforestation projects have been approved, and one certified[5] through the UNFCCC's Clean Development Mechanism (CDM) Executive Board.

It is important that U.S. Registry and program rules reflect key UNFCCC principles of additionality, permanence, and leakage in ways that promote additional and long term carbon sequestration benefits. Unfortunately, the current definitions for these key principles were developed several years before forest offsets were recognized within the UNFCCC to address emission reduction targets for direct emitters of CO_2. The result is that these definitions are not appropriate to conceptualize or communicate the role of sustainably managed forests as producers of carbon offsets for climate change mitigation.

There is a need to develop a national policy and forest project standards that promote the role of forest offsets in the U.S., which 1) help keep forests in forests, and 2) sequester more carbon through sustainable forest management[6].

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[3] The UNFCCC was ratified by the United States on 15 October 1992.

[4] Registries are bodies that develop rules for emission reductions, including the issuing, qualification, quantification, verification, and registration of emission allowances, and emission reduction credits such as forestry offset project credits.

[5] The CDM is the means by which developing countries can be involved with offset projects funded by developed countries. The UNFCCC has defined forestry projects to be a temporary offset project type that can be certified under rules set by the CDM Executive Board.

[6] Three important topics that are not addressed in this paper include, 1) the lower embedded energy and CO2 emissions from manufacturing wood products as compared to steel, plastics and aluminum, 2) the CO2 emission avoidance that can be achieved by changing fire regimes, and 3) the substitution of bio-fuels for fossil fuels.

The Need for U.S. Forest Offset Policy

There is need for developing mandatory national standards that promote the registration and trading of forest carbon offset projects (Sampson, 2004, Richards, et al. 2006, Ruddell, et al. 2006, Helms, 2007). In the absence of such national standards, the eligibility of forest offset projects will continue to be limited and inconsistent[7]. This is perhaps best illustrated in the differing eligibility rules (Ruddell, et al. 2006) for forest offset projects within the four primary existing U.S. Registries and programs in the US; California Climate Action Registry (CCAR), National Voluntary Greenhouse Gas Reporting Program (1605(b)), Chicago Climate Exchange (CCX), and the Regional Greenhouse Gas Initiative (RGGI) program. These multiple eligibility and program rules create cost and institutional barriers that may limit participation in carbon markets and reduce investment in sustainable forestry as a climate change mitigation measure.

The California Climate Action Registry allows managed forest projects, although they may be restricted by California legislation (CCAR, 2005). The 1605(b) rules allow entity-wide reporting for forest management using growth models and lookup tables (Birdsey, 2006). Managed forest offset projects do not qualify under the current RGGI Model Rule (RGGI, 2007) or CCX rules (CCX, 2006)[8]. The limited role of sustainably managed forests appears to be rooted in concerns over how they would meet key project principles that have been handed down to the international forestry community from the UNFCCC. Recall that the key international principles are additionality, permanence, and leakage of CO_2 sequestration. Accurately evaluating the project baseline is also essential for the verification of additionality. A discussion of these key principles under current U.S. forest carbon emission reduction projects is provided by Cathcart and Delaney, 2006.

Today, as U.S. lawmakers move at a rapid pace to address national GHG policy, the forestry community faces a significant opportunity for shaping what kinds of forest projects are addressed. All forestry practices that provide climate change mitigation benefits should be promoted. To be successful in having a diversity of forest projects included in GHG policy, the forestry community needs to develop acceptable program structures, concepts, and terminology for measurement, monitoring, verification, and registration of forest offset projects.

Two key policy objectives for the forestry community and policy makers should include: (1) keeping forests in forests, and (2) sequestering more carbon through sustainable forest management. Achieving these objectives can result in powerful new incentives for landowners to maintain forests and manage them sustainably. These key policy objectives can be accomplished by:

- Prompting a re-thinking of the existing definitions for additionality, permanence, leakage, and baseline setting as they relate to the role forests play in climate change mitigation,
- Ensuring that the role of harvested wood products is recognized for the long term storage of carbon,
- Demonstrating to non-foresters (such as investors, policy makers, and buyers) that carbon storage within forests can be reliably measured, monitored, and verified,
- Ensuring project rules provide incentives that help maintain existing forest carbon sinks as well as promoting additional carbon storage through forest management,

[7] This paper does not address the U.S. voluntary "retail" carbon market. Despite the fact that this market dominates carbon trading in the U.S., no standards currently exist. We believe that policy initiatives that will define standards in the mandatory markets will eventually influence standards in the retail market.

[8] The Maine Forest Service has been asked to work with the RGGI Working Group to investigate how managed forests might be included in the Model Rule. The Chicago Climate Exchange Forestry Committee is currently considering a managed forest offset rule.

- Providing incentives for the maintenance of future and existing forest resource values in ways that discourage conversion of forests to other land uses.

Policy Objective #1: Keeping Forests in Forests

Resource values drive investments. A basic principle of forest resource economics is that forest ecosystems will remain forested so long as the values (wood products, clean water, clean air, and biodiversity) gained are greater than the opportunity costs of converting the forest to an alternative land use. As an example of the pressures facing forests today, a recent report found that in the Chesapeake Bay watershed alone some 750,000 acres have been developed since the 1980s, a net loss of forestland of 100 acres each day to other land uses (The Conservation Fund, 2006).

In many states, forest cover has experienced a net recovery for decades – with concomitant increases in sequestration services. For example, Pennsylvania has maintained a steady increase in forested acres for many years. However, while much of the U.S. forest base has stabilized, the total acreage in forestland has been stable in places because the reversion of agricultural lands to forests has balanced conversion of forests to development uses.

It is our view that national policy should promote sustainable forest management practices, so that all present and future forest values can be recognized and maintained and conversion to other land uses discouraged.

Policy Objective #2: Sequester More Carbon Through Sustainable Forest Management

The dynamics of forest growth under different silvicultural practices tells us that sustainably managed forest projects can sequester more carbon over time than unmanaged forests. An example can illustrate this point. Afforestation offset project types are eligible under all of the four primary U.S. Registries and programs within the U.S. This is consistent with the Kyoto Protocol since an afforestation project can demonstrate the additionality principle. That is, through the human-induced activity of planting a forest where historically a forest did not exist, the carbon sequestered is additional to what would have been there without the afforestation project. However, stand growth dynamics tell us that this new forest (like any unmanaged forest) will eventually stop sequestering additional net carbon as it reaches biological maturity, where sequestered carbon equals emitted carbon through decay.

However, sustainable management practices keep the forest growing at a higher rate over time, providing net sequestration benefits that are additional to that of an unmanaged forest. If this same afforestation offset project is sustainably managed past the point of biological maturity, then harvesting (a human-induced activity) can be an effective tool for improving forest health while sequestering more carbon than an unmanaged forest. Therefore, in terms of meeting the additionality principle, forest management actions that create additional carbon and climate change mitigation benefits within existing managed forests should be recognized.

Managed forests provide climate change mitigation benefits over time through the delay of wood-decay CO_2 emissions from harvested wood products, as compared with the decomposition or burning of wood in unmanaged forests. Harvested wood products that have long life cycles after production can store carbon for decades into the future. The DOE Section 1605(b) Technical Guidelines (Department of Energy, 2007) provides for methods that quantify the 100 year life of carbon in harvested wood products. The use of these or other science-based rules in U.S. Registries and programs will ensure that the real storage effect is recognized for forest offset projects. For managed forests, the recognition that harvested wood products increase sequestered carbon pools is critical in demonstrating the full range of additional carbon that is stored during the life cycle of long lived forest products.

Key UNFCCC Principles: Additionality, Permanence, and Leakage

Additionality, Baseline Setting, Business-as-Usual, and Base Year

All U.S. Registries and programs consider additionality, permanence, and leakage in their rules. Since the environment must benefit from any forestry offset project where emission reduction credits are issued, the amount of carbon sequestered must be additional to what would have occurred without the project. Such comparisons may require modeling and predictions of sequestration under alternate scenarios, injecting uncertainty into the assessment of additionality.

The carbon stock "baseline" establishes a starting point from which sequestered carbon is measured. Future measurements to verify additional sequestration assume an accurate baseline against which changing carbon stocks may be assessed. Emission reduction credits can only be issued once net change in carbon sequestration is verified. Typically, on land that will be retained as forest, baseline carbon values are determined through standard forestry biometric methods that include direct and statistically designed and modeled measurement techniques. Baseline measurement standards must be addressed as the forest community rethinks the existing vocabulary for additionality, permanence, and leakage in ways that provide incentives to landowners to manage forests as carbon offset projects.

Published materials that provide guidance for how to handle the key principles do not explicitly or comprehensively address managed forests, and do not prescribe specific standards for the assessment of baselines in managed forests. For example, the UNFCCC's generic tool for the demonstration and assessment of additionality (UNFCCC, 2007 c) is applicable to clean technology offset projects, i.e. alternative energy, manure digester, and landfill methane collection, but does not address sequestration through managed forest offsets. On the other hand, the World Resources Institute's (Greenhalgh, et al., 2006) GHG Protocol for Project Accounting provides some guidance for forest offset project accounting. These guidelines focus on two types of forest sequestration projects, (reforestation and forest management) and illustrate some of the carbon accounting issues that need to be addressed. However, these are meant to be broad guidelines, and leave it up to individual Registry and program rules to determine exactly how forest offsets qualify.

A common term used in definitions for voluntary U.S. Registries and programs is "business-as-usual" (BAU). This term has been used to establish the baseline from which anthropogenic change is measured as additional. BAU is a term that was created for clean technology offset projects where additional climate change mitigation can be evaluated with and without the project. However, nowhere in the UNFCCC Articles is the term BAU defined in the context of setting forest offset baselines.

Under one approach used by some Registry and program rules, a forest project baseline would not only measure the existing carbon stock, but model how that stock would increase or decrease over the project time period. Credit is not given for the difference between the starting carbon stock and the end carbon stock, but for the difference between the modeled end point without the project, and the actual end point with the project. While modeling may be straightforward for unmanaged afforestation projects, modeling carbon stocks for forests already under management is more difficult because projected sequestration and emissions are influenced by human decisions. This necessitates determining a BAU scenario, which can be subjective and complex to define.

One problematic issue impacting the establishment of BAU in managed forests is that there is no credible method to separate the management actions made on a forest from the impacts of environmental conditions over time. Other important factors such as changing forest management objectives, markets for alternative land uses, timber prices, ecosystem service prices (e.g. the price of

sequestered carbon), and changes in technology and knowledge all contribute to a high level of inherent uncertainty when defining a baseline under the BAU scenario. Given the current trend of converting sustainably managed forest land and high value forest ecosystems to other uses such as housing, it is clear that BAU is not a useful concept for forestry, or must be redefined. Unlike the baseline emissions of a direct emitter of CO_2 (a coal power plant, for example), which are precisely measured and operationally controlled, forest offset BAU baselines cannot be defined without uncertainty. Under present rules if the BAU baseline cannot be precisely defined, the project cannot be quantified, verified, or registered.

However, the use of BAU in forested ecosystems is relevant for setting forest offset baselines under limited and clearly defined conditions. For forest offsets, two typical situations include the presence of forest practices legislation and deed restrictions on land use, such as permanent conservation easements. These conditions mandate how forests are managed, and therefore are suitable to set the BAU baseline. In these situations, forest practices legislation and permanent easements may increase the opportunity cost of investing in or maintaining ownership of forests for climate change mitigation. This issue is problematic for sustainably managed forests because investors, policy makers, and buyers of carbon offsets do not have a full understanding of how opportunity costs apply to a forest offset project. Sustainably managed forest offset projects absorb the opportunity costs associated with keeping their forests intact; foregoing potential profits from development or conversion to other land uses. In the case of permanent conservation easements, the opportunity cost of forgoing land development (forever) may be enormous, a reality which is not presently reflected in compensation mechanisms. Many landowners may unnecessarily avoid participation in offset programs because of these high costs. In addition to opportunity costs, inventory, fertilization, planting, management, and forest certification costs are absorbed by sustainably managed forest offset projects. One way to promote forests staying in forests is to develop new strategies and funding sources that allow sustainable forest management to compete with development opportunities, by addressing the true costs of sustainable forest management.

An alternative approach (to BAU) relies directly upon carbon stock change measurements in the forest. This has been called the "base year" approach. Using this approach, an inventory is taken at the beginning of the project period, and a second inventory is conducted some years later, using the same inventory design. The net change in carbon stocks (of all allowable carbon pools within the forest offset project) represents the carbon sequestration in the forest for that period of time. In a sustainably managed forest, this net change in carbon stocks will include all the forest management actions such as harvesting, tree planting, fertilizing, etc. It will also reflect the impacts on carbon stocks from natural events like weather, wildfire, and insect and disease. Carbon accounting systems will account for (and verify) the total net change (positive or negative) in carbon stocks associated with impacts of these natural events, as well as anthropogenic management actions.

Regardless of the approach used, Registry and program rules must account for the harvested wood products that result from management. Accounting for removal of long lived forest products balances the annual fluctuations in carbon stocks resulting from management actions (such as harvesting) and, in the ideal case of a fully regulated forest, will represent the only net change in carbon stocks that the forest will produce in the future.

For forest based projects to become fairly included in carbon trading programs, policy initiatives that require **additionality** need to address the following issues:

1. **Regulatory Requirements** – Do projects have to demonstrate that their offsets are additional beyond those offsets achieved through forest practices regulations?

2. **Timing / Discounting** – Should projected future carbon offset benefits be discounted to the present and applied in reporting periods occurring prior to their accrual, or should actual net change in carbon stocks be measured and verified before sold/traded?
3. **Financial Barriers** – Policies should not create unnecessary costs that prevent investments in the project from making an acceptable financial return.
4. **Harvested Wood Products** – Policies need to recognize that harvested wood products have long life cycles that store carbon for long periods, increasing sequestered stocks.
5. **Opportunity Costs** – The high opportunity costs for forest offset projects are real investments required for forest ownership and sustainable management, and owners require returns on their full investments to justify offset projects. The climate change benefits from managed forests and deforestation prevention are not free, and when benefits are undervalued by offset projects, investors have an incentive to deforest their holdings.

Permanence and Leakage

The two remaining Kyoto Protocol key principles that forest offset projects need to address are permanence and leakage. Both of these principles are complex. Therefore, it is important and appropriate to rethink these terms within the context of forested ecosystems.

Ensuring that a forest offset project is **permanent** can be difficult, if not impossible, since the amount of carbon sequestered might be emitted through natural events such as wildfires and hurricanes, or through management activities, such as harvesting. Rather than suggesting that any natural system is in a permanent unchanging state, it would be more technically correct and feasible to establish a goal of maintaining a forest system in a long-term state of *management stability*. The goal is to provide reasonable assurance that the forest carbon stocks claimed will remain in the forest, in a stable condition, for the length of the reporting or trading commitment. Since this can not be guaranteed over long time periods, it is necessary to disclose the various sources of risk involved and take action (such as provide insurance) to mitigate them. Accounting rules and policies can then be established to address risk issues, i.e. replacement risk, and if market trading occurs, the price accorded the forest offset credits will be a reflection of the buyer's calculation of the risk-assessed value or insured value of the credits.

Policy initiatives that promote **management stability** and the long-term retention of carbon stocks should consider:

1. **Land Use Restrictions** – Voluntary restrictions, i.e., conservation easements placed on the future uses of the project lands to help prevent their conversion to non-forest uses and to maintain carbon stocks.
2. **Mitigating Replacement Risk** – Mitigating for the risk of forest carbon loss through insurance or contracts.
3. **Maintaining Carbon Reserves** – Requiring carbon credits to be retained and not sold until they are no longer needed to help guarantee the integrity of the reported amounts.
4. **Stability Through Ownership Changes** – Contractual conditions stating how forest carbon stocks will be maintained through an ownership transfer.
5. **Payback Provisions** – Provisions requiring the replacement of carbon credits when these credits are lost for any reason.
6. **Long-term Commitment** – The project owner demonstrating a long-term commitment to maintaining carbon stocks in forests as a climate change mitigation measure.
7. **Commitment to Sustainable Forestry Practices** – Forests being managed sustainably across the ownership or management unit, consistent with a defined standard.

Leakage is a term that addresses the impact that the project might have, i.e. an increase or decrease in sequestered carbon, outside the boundaries of the project, and can be very difficult, if not impossible, to practically measure for forest offset projects. Any human-induced forestry actions have effects. By considering the consumption of forest products to be reasonably stable, then any decision to sell forest products would expect to have a low impact on market prices that would be difficult to accurately isolate and quantify.

The leakage issue most commonly cited is associated with land use change, not with forests. Where forest protection prevents the conversion of one piece of forest (perhaps due to an easement) from being developed, it is unlikely that development will cease in the region. Instead, the developer finds another piece of land, perhaps another forest. Thus, the environmental value of the "protection" of the first forest was essentially lost at the regional scale.

Putting these ideas in context, a policy objective that supports sustainable forest management practices is critical to minimizing any undue impact in permanence or leakage. Assuming that well-functioning forest product markets are available, if sustainable forest management is practiced across the entire forest ownership, future carbon stocks should be stable, the accounting will be reasonably accurate, and leakage will be a non-issue.

Summary

As the U.S. considers GHG emission reduction legislation, the forestry community has a significant opportunity to influence the policy arena in development of carbon offset project rules. Current definitions for the key principles of additionality, permanence, and leakage were developed to address emission reduction for direct emitters and are not wholly appropriate to the role forests play as carbon offsets for mitigating climate change.

Two key policy objectives for the forestry community and policy makers include: (1) keeping forests in forests, and (2) sequestering more carbon through sustainable forest management. Policy initiatives have been suggested that should challenge policy makers and the U.S. forestry community to rethink forest offset project rules as the U.S considers GHG emission reduction legislation.

It is true that forest management actions are currently not driven by current offset prices (Clean Air-Cool Planet, 2006)[9]. However, carbon values can and should become an important ancillary benefit that can encourage investments in forest management. In order for that to occur, the rules with which carbon stocks are measured, monitored, verified, and registered must be clearly defined to keep costs reasonable.

The ultimate goal for producing forest offset credits for reporting to a U.S. Registry or program is to provide a high-quality forest commodity that is well defined, accounted for using uniform standards that manage uncertainty, that is insurable, auditable, valued or discounted according to the duration of the investment, and paid back or replaced if lost or never delivered. This must be done in a manner that has low enough transaction and verification costs to be economically feasible for the project owner.

[9] The price of carbon per metric ton in voluntary forest offset project markets has been reported in the range of $4.00 - $13.00. Besides price, other factors that affect the economic feasibility of a forest offset project include growth rates, harvest rates, project size (area in forest), costs of inventory for setting the baseline, verification costs, and costs for demonstrating sustainable forest management practices to a defined forest management standard.

Bibliography

Birdsey, R.A., 2006. Carbon accounting rules and guidelines for the United States Forest Sector. Journal of Environmental Quality. 35:1518-1524.

Birdsey, R, K. Pregitzer, and A. Lucier. 2006. Forest carbon management in the United States: 1600-2100. Journal of Environmental Quality 35:1461-1469.

California Climate Action Registry (CCAR), 2005. Forest Project Protocol. June. 138 p. Available online at: http://www.climateregistry.org/docs/PROTOCOLS/Forestry/Forest_Project_Protocol_10.21.04.pdf

Capoor, K., and P. Ambrosi, 2007. *State and Trends of the Carbon Market 2006. World Bank.* Washington D.C. May. 45 p. Available online at: http://carbonfinance.org/docs/Carbon_Trends_2007-_FINAL_-_May_2.pdf

Cathcart, J., and M. Delany. 2006. Carbon Accounting: Determining Carbon Offsets from Projects. P 157-174 in *Forests, Carbon and Climate Change: a synthesis of science findings*, Oregon Forest Resources Institute, Portland, OR. http://www.oregonforests.org/media/pdf/CarbonRptFinal.pdf

Chicago Climate Exchange (CCX), 2006. *Rulebook.* Chicago, IL. July. 179 p.

Clean Air – Cool Planet, 2006. A *Consumers Guide to Retail Carbon Offset Providers.* Portsmouth, NH. Prepared by Trexler Climate + Energy Services, Inc. 28 p. Available online at: http://www.cleanair-coolplanet.org/ConsumersGuidetoCarbonOffsets.pdf

Department of Energy. 2007. *Section 1605(b) of the Energy Act of 1992. Technical Guidelines for Voluntary Reporting of Greenhouse Gas Program. Chapter 1 – Emission Inventory. Part I: Appendix.* Available online at http://www.usda.gov/oce/global_change/Forestryappendix.pdf

Heath, L.S., and J.E. Smith. 2004. Criterion 5, Indicator 27: Contribution of forest products to the global carbon budget, including absorption and release of carbon (standing biomass, coarse woody debris, peat and soil carbon). P. 1-7 in *A supplement to the national report on sustainable forests 2003* (D.R. Darr, editor). FS-766A, Washington, D.C.

Helms, J.A. 2007. Testimony Before the House of Representatives Select Committee on Energy Independence and Global Warming, Washington D.C. April 27. Available online at http://www.safnet.org/policyandpress/documents/testimony_dr_john_helms.pdf

Regional Greenhouse Gas Initiative (RGGI), 2007. Model Rule. January 163 p. Available online at: http://www.rggi.org/docs/model_rule_corrected_1_5_07.pdf

Richards, K. R., R. N. Sampson and S. Brown. 2006. *Agricultural and Forestlands: U.S. Carbon Policy Strategies.* Arlington Virginia. The Pew Center on Global Climate Change. 72 p.

Ruddell, S., M.J. Walsh, and M. Kanakasabai. 2006. *Forest Carbon Trading and Marketing in the United States.* A Report to the North Carolina Division of the Society of American Foresters. Available online at http://www.foreconinc.com/articles.asp?NewsID=34

Sampson, R.N. 2004. Integrating land use, land use change, and forestry into a mandatory national greenhouse gas reduction program, P. 63-72 in *A Climate Policy Framework: Balancing Policy and Politics.* J. A. Riggs (editor). Queenstown, MD: The Aspen Institute.

Stern, N. 2006. *The Economics of Climate Change: The Stern Review.* HM Treasury. Available online at www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

The Conservation Fund. 2006. *The State of Chesapeake Forests.* Edited by Eric Sprague, et.al. Arlington, VA. 144 p.

Greenlalgh, S, D. Florence, and E. Weninger. 2006. The Land Use. Land-Use Change, and Forestry Guidance for GHG Project Accounting. World Resources Institute. Washington, DC. 96 p.

United Nations Framework Convention on Climate Change (UNFCCC). 2002. Report of the Conference of the Parties on the Seventh Session, held at Marrakesh, from 29 October to 10 November 2001. FCCC/CP/2001/13/Add.1. 21 January. Land Use, Land Use Change and Forestry. Decision 11/CP.1 P. 54. Available online at http://unfccc.int/resource/docs/cop7/13a01.pdf#page=54

United Nations Framework Convention on Climate Change (UNFCCC). 2007 a. *Status of Ratification of the Kyoto Protocol.* Available online at http://unfccc.int/kyoto_protocol/background/status_of_ratification/items/2613.php

United Nations Framework Convention on Climate Change (UNFCCC). 2007 b. *Status of Ratification of the UNFCCC.* Available online at http://unfccc.int/essential_background/convention/items/2627.php

United Nations Framework Convention on Climate Change (UNFCCC). 2007 c. *CDM Executive Board. Tool for Demonstration and Assessment for Additionality.* Version 03. Available online at http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf