

Greenhouse Emission Offsets from Forests—A Review of Current Legislation and Commercial Practices

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Introduction

Actions needed to address the threat of global climate change cut across almost every sector of the global economy. The forest and land use sector is a particularly important element because past and current degradation and loss of forest ecosystems is a significant contributor to net global greenhouse gas emissions. Forest ecosystems store more carbon than the atmosphere,¹ and the erosion of the terrestrial carbon pool adds approximately 20% to the atmospheric build-up of greenhouse emissions from fossil fuel combustion.² However, forests are also recognized as a potential part of the solution, as reforestation and improved forest management can make a significant early contribution to slowing the build-up of greenhouse gases in the atmosphere.³

Studies have shown that reforestation can make a cost-effective contribution to reducing the net accumulation of greenhouse gas emissions, particularly over the next two or three decades.⁴ Comprehensive reviews of the cost effectiveness of reforestation indicate that in many areas the net cost of reforestation as a carbon sink is very low, and even positive, when other environmental, social and economic benefits are included.⁵ In addition, actions to create forest-based carbon offsets can be taken immediately. Moreover, carbon offsets can bridge longer-term efforts to make major technological changes in the electricity and transportation sectors.

As greenhouse gas regulation increases around the world, many governments, businesses and environmental groups have made strides to incorporate sequestration of carbon in forests as a part of emissions trading or project-based mitigation protocols. Retail carbon offsets are also emerging that allow businesses and consumers to reduce their environmental footprint. This paper reviews the state of regulation and commercial practice in the use of forest-based offsets and compares the

¹ Y. Malhi, P. Meir, and S. Brown, "Forests, Carbon and Global Climate," *Phil. Trans. Royal Society of London*, 2002, 360, pp. 1567-1591.

² Eileen Claussen, ed., "Climate Change: Science Strategies and Solutions," Brill, Boston, The Pew Center on Global Climate Change, 2001.

³ S. Pacala, and R. Socolow, "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies," *Science*, Vol. 305, Issue No. 5686, pp. 968-972, August 13, 2004, <http://www.sciencemag.org/cgi/content/full/305/5686/968?ijkey=K6cRPbiYRFwus&keytype=ref@siteid=sci>.

⁴ See Robert N. Stavins and Kenneth R. Richards, "The Cost of U.S. Forest-based Carbon Sequestration," Washington, DC, Pew Center on Global Climate Change, January 2005, <http://www.pewclimate.org/docUploads/Sequest%5FFinal%2Epdf>.

⁵ P. Benitez, I. McCallum, M. Obersteiner, and Y. Yamagata, "Global Supply for Carbon Sequestration: Identifying Least Cost Afforestation Sites under Country Risk Considerations," 2004, <http://www.iiasa.ac.at/Research/FOR>.

approaches being taken in a range of programs around the world. The objective is to provide a basis for further development of forest offset programs which can make a difference to net greenhouse gas emissions in the coming decades.

Development of the Concept of Forest Offsets

Early work on forest offsets was undertaken by US utilities that purchased forests or funded conservation efforts in tropical forest areas.⁶ The Canadian Government as part of its 1990 Green Plan set out a program called Tree Plan Canada that would provide for tree-planting as a strategy to address climate change. In 1992 the Earth Summit in Rio de Janeiro first began to negotiate a role for forests in the UN Framework Convention on Climate Change, setting the objective of stabilizing greenhouse gases in the atmosphere at a safe level and specifying a need to both reduce emissions and enhance forest sinks.

During the mid-1990's, parties negotiating binding international emissions limits became increasingly skeptical over the role of forest sinks. At the same time, industry, particularly electric utilities, had begun to undertake major projects in South America to protect tropical forest areas to implement the concept of avoided deforestation. Projects such as the Noel Kempf Mercado rainforest protection initiative in Bolivia appeared to offer substantial greenhouse benefits relative to their cost.⁷ Ultimately, however, the Kyoto Protocol rules did not include avoided deforestation as a means to reduce greenhouse gas emissions. Instead, the Kyoto Protocol allowed countries to credit net sequestration of carbon in reforestation and improved forest management projects against their emissions accounts. Efforts shifted to reforestation and improved forest management as primary strategies for using forests as offsets.

In May 1997 the first carbon trade that actually used a price per tonne of carbon sequestered was brokered by Environmental Finance between the Government of Norway and the Government of Costa Rica. This transaction, verified by SGS certifiers, broke new ground in the efforts to 'commodify' carbon in forests. Following this transaction, State Forests of New South Wales in Australia undertook carbon trades sourced from reforestation projects with Pacific Power and Delta Electricity. Due to the emergence of the Kyoto Protocol, carbon offset projects in forests began to proliferate, and many large corporations began to undertake reforestation projects, particularly in Australia and the United States. Environmental groups, while recognizing the benefits of reforestation, resisted endorsing these projects and sought a primary focus on direct reductions in greenhouse gas emissions from industrial sources.

The major criticisms of forestry offsets centered on potential measurement uncertainties and the question of permanence. The permanence issue arises from the need to ensure that a tonne of carbon dioxide absorbed in forests would be equivalent

⁶ One of the earliest, and perhaps the first, carbon sequestration project was the AES/CARE Guatemala Agroforestry and Carbon Sequestration project, which began in 1990. See Pedro Moura-Costa and Marc Stuart, "Forestry-based Greenhouse Gas Mitigation: A Short Story of Market Evolution" at http://www.forest-trends.org/documents/misc/forest_carbon/evolutionpaper.pdf for further details.

⁷ See the Noel Kempf Mercado project at <http://www.noelkempff.com/English/Welcome.htm> for further details.

in terms of its length of storage to the period that a tonne of carbon dioxide emissions would remain in the atmosphere—approximately 100 years. Early carbon reduction projects often used relatively simplistic accounting systems and were often silent on the long term obligations of the carbon seller to retain the carbon stock in place. Although market participants made substantial progress on the development of carbon accounting systems, registries and property rights legislation, many national governments and environmental organizations, particularly in Europe, remained skeptical and resisted a significant role for forestry offsets in emissions trading regimes.

Based on work in the late 1990's and continuing up until today, significant strides have been made in the legal, technical and commercial aspects of forestry offsets. Substantial legal, technical, and regulatory systems are in place, and a wide array of commercial transaction experience can be drawn upon. In the following sections we review this experience as a basis for further development of the use of forestry offsets by regulators, business and the individual consumer.

The Kyoto Protocol

The Kyoto Protocol to the UN Framework Convention on Climate Change, negotiated in Kyoto, Japan, in November 1997, was the first international treaty to establish binding national government commitments to specific greenhouse gas emissions limits. While only developed countries (so-called Annex 1 countries) made quantitative commitments, the Protocol also provided for a set of Flexibility Mechanisms to allow international arrangements for greenhouse gas emission reduction projects that would include developing country participation. The Protocol was ground-breaking in establishing the rules for an international market in greenhouse gas emissions to emerge. However, the Protocol soon began to founder on the complexity of the detailed rules needed to make the agreement operational, and it took a further five or six years to reach final agreement via the Marrakech Accords.⁸

Forest sink rules were among the most hard-fought elements of the Protocol, and final agreements were only completed at the Conference of Parties (COP) 9 in Milan in 2003. While limiting the role of forest sinks, the rules also provide a basis to move forward with the operational and commercial development of these new provisions.

Article 3.3

Article 3.3 of the Kyoto Protocol requires Annex 1 countries to track afforestation, reforestation and deforestation processes. The change in carbon stocks associated with these events during the first commitment period (2008-2012) is added or subtracted from the Assigned Amount (agreed emissions limit) of the country. So, for example, if a country like Australia has established reforestation projects on previously non-forested areas of over 1 million hectares since 1990 (the baseline year of the Kyoto Protocol), then the carbon sequestration in those forests is added to the Assigned Amount of Australia. This provides a mechanism for countries to offset some of their emissions from energy, industry or transport via the forestry sector.

⁸ The complete text of the Kyoto Protocol and the Marrakech Accords can be found at <http://www.unfccc.int>.

The Protocol uses stock change accounting, which converts biomass to carbon stock, and then calculates the net increase (or decrease from fire, harvesting, etc.) over a given period of time. Therefore, areas of immature plantation forest will contribute positively to the emissions balance of Annex 1 countries as the trees grow. It is important to note that countries will be required to face international scrutiny of their forestry carbon accounting systems to ensure that appropriate best practice guidance is utilized.⁹ It is also worth noting that timber harvesting is treated as an immediate re-emission to the atmosphere, even when wood products may remain in use for decades. This provides an inherently conservative approach to carbon stock accounting.

Article 3.4

The Kyoto Protocol also makes provisions for countries to use stock change accounting related to improved forest management and other land-based sources and sinks. This could include reducing losses to fire, extending growth or 'rotation periods' in production forests, increasing soil carbon in agricultural areas, or other activities that will create measurable increases in biomass or soil organic matter carbon stocks. Countries negotiated a ceiling on the use of Article 3.4, so that massive increases in carbon stock in the extensive forests of Russia, the United States or Canada, for example could not be used to avoid making emission reductions in other sectors. Being a capped aspect of the national emissions accounts, Article 3.4 provisions will not necessarily lead to a direct tonne for tonne crediting in the national accounts.

Countries must declare in advance which provisions of Article 3.4 they will utilize and can select from a menu of items. This requires careful consideration, as countries that trigger elements of Article 3.4 may introduce the risk that there will be carbon stock losses instead of gains, for example if a warmer, drier climate lead to increases in fire frequency or severity.

The Clean Development Mechanism and Forestry

While developing countries (or non-Annex 1 countries) were not required to take on fixed emissions limitations, they are able to benefit from the Kyoto Protocol via the Clean Development Mechanism (CDM). This Flexibility Mechanism allows Annex 1 countries to invest in clean energy developments and other activities to reduce emissions in non-Annex 1 countries and then to repatriate the emissions reductions to their national emissions accounts. Forestry was controversial in the CDM, and final negotiations led to a cap on forestry credits imported by any country to 1% of their Assigned Amount. Again, the credits are only to come from reforestation or afforestation projects. To address the risk of non-permanence in these credits, the CDM rules require that forestry credits are non-permanent, and only defer obligations for a period of 10 to 60 years. These credits are known as tCERs (Temporary Certified Emissions Reductions) and ICERs (long-term Certified Emissions Reductions), depending on the period of obligation to retain the carbon stock.

⁹ The Intergovernmental Panel on Climate Change has published a report on good practice guidelines for land use, land use change, and forestry. The report can be found at <http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf.htm>.

While the CDM rules have been finalized, implementation remains slow. The CDM Afforestation/Reforestation Working Group rejected two forestry projects submitted for registration based on methodological issues. A third project sponsored by the World Bank Bio-Carbon fund is being reviewed. Much of the criticism by the administrators of the CDM has been based on uncertainty in baselines and accounting systems. It can be expected that once a forestry project has been approved, this approved methodology will form a basis for further projects to follow.¹⁰

AAU's, CER's, ERU's and RMU's—The Currencies of the Kyoto Mechanisms

The Kyoto Protocol has established a number of carbon currencies with a range of acronyms. The basic units of carbon emission allowance to Annex 1 national governments are Assigned Amount Units (AAUs) which equal the annual emission limit for the first commitment period (2008-2012) multiplied times the five years. Countries will be required to establish a national Kyoto Registry that tracks emissions against their Assigned Amount Units. There are penalties for non-compliance that include a requirement to add shortfalls from the first commitment period to future commitment period obligations (that have not yet been determined).

The Flexibility Mechanisms (International Emissions Trading (IET), Joint Implementation (JI) and the Clean Development Mechanism (CDM) allow countries to purchase Assigned Amount Units from other countries, or to engage in project based activities in other Annex 1 countries (JI) or in Non-Annex 1 countries (CDM). JI project credits are known as Emission Reduction Units (ERUs), while CDM credits are called Certified Emissions Reductions (CERs). The forestry credits created from Article 3.3 and 3.4 are called Removal Units (RMUs), and unlike other credits cannot be banked from one commitment period to another. As noted above, forestry credits in the CDM are also distinguishable as tCERs and ICERs. The non-bankability of RMUs is likely to lead to these being always extinguished first in the national accounts, and AAUs being the currency of banking between commitment periods.

In addition to these Kyoto Units, a last form of unit traded is the Verified Emission Reduction (VER). This is a carbon offset or credit that does yet qualify under the Kyoto Protocol. VERs might have been generated from projects in countries that have not yet ratified the Kyoto Protocol or may be from projects that have not yet been accredited under the Kyoto Mechanisms. The majority of transactions to date in the carbon market have involved trades of VERs.

Other Forestry Offset Regulations and Registries

The Kyoto Protocol forms the basis of international arrangements (at least for countries that have ratified the Protocol), but national and increasingly sub-national governments will regulate the actual emissions activities of business. A range of national and sub-national programs and regulations are emerging that will form the tapestry of the international carbon market. Given the proliferation of these approaches and the difficulty to track every development, a set of examples will be used to portray the types of regulations and commercial approaches emerging. The

¹⁰ See the Clean Development Mechanism at <http://cdm.unfccc.int/> for further details.

emphasis is on those schemes that include forest carbon sequestration as an allowable offset technology.

New South Wales, Australia—Greenhouse Gas Abatement Scheme

The New South Wales Government (NSW) has been an international leader in actions to address greenhouse gas emissions. In 1997 the Government set a target on greenhouse gas emissions from the electricity sector, regulating electricity retailers to reduce emissions from electricity sold in the state by 5% per capita. The retailers were allowed to increase electricity prices to enable them to reduce emissions. As the scheme set no penalty for non-compliance, greenhouse emissions actually grew over the ensuing five years. In December 2001 the NSW government released modeling indicating that a penalty could be used to spur compliance, linked with a market-based mechanism that would allow trading in emissions offsets, including from reforestation projects compatible with Article 3.3 of the Kyoto Protocol. After a period of public consultation, legislation was passed in November 2002, which introduced the NSW Greenhouse Gas Abatement Scheme (GGAS) in January 2003.¹¹

The scheme introduced a non-tax deductible penalty of \$AU10.50 for excess greenhouse gas emissions over the energy pool target. Given the 30% corporate tax rate, this created an effective penalty tax rate (and value for offsets) of \$AU15.00. The 5% per capita reduction in emissions is being implemented in stages from 2003 to 2007. This policy created a requirement for reductions increasing from 1 million tonnes in 2003 to 20 million tonnes in 2007. The scheme is currently mandated until 2012, although a current government discussion paper is considering extending the scheme to 2020.

The GGAS is somewhat unique in embracing the use of forestry offsets. The rules require that Abatement Certificate Providers (ACPs) be registered with the regulator (the Independent Pricing and Regulatory Tribunal of NSW (IPART)). ACPs register forestry areas and the tonnes of sequestration based on the report of an independent verifier appointed by IPART. The ACPs must sign a Maintenance Obligation Deed agreeing to retain the carbon stock for 100 years, and a land title restriction is used to ensure compliance. The carbon accounting rules are set out in a carbon accounting standard established by the Australian Standards Bureau.¹²

The first ACP registered was CO2 Australia, a private company undertaking forestry investment on behalf of retail investors. The company has now announced forward carbon offset contracts with Origin Energy and Country Energy, two NSW energy retailers, worth up to \$AU60 million. State Forests of NSW, the government-owned forestry agency, completed the first actual carbon sale under the GGAS in February 2005, selling 137,000 tonnes of Abatement Certificates for \$AU11.25. The NSW market appears to be working effectively, with a growing range of actors bringing a variety of offsets to the market, and a weekly pricing of offsets being circulated by the

¹¹ See the NSW GGGAS website at <http://www.greenhousegas.nsw.gov.au> for further details.

¹² See the Australian Standards Bureau at <http://www.standards.com.au>. Information on “AS 4978.1(Int)-2002: Carbon accounting for greenhouse sinks - Afforestation and reforestation” can be found at <http://www.standards.com.au/catalogue/script/Details.asp?DocN=AS234691903616>.

Australian Financial Markets Association¹³ and Next Generation Energy Solutions.¹⁴ As of the date of writing this paper, offsets are trading for \$AU11.40 per tonne on the spot market and forward vintages trade for up to \$AU14.00 per tonne.

New Zealand Permanent Forest Sink Initiative

New Zealand has ratified the Kyoto Protocol and therefore can participate in the Kyoto Flexible Mechanisms. The country is interesting in that half its greenhouse gas emissions balance is attributed to the agriculture sector, particularly methane emissions from sheep and cattle. The country also has an extensive plantation forestry estate with over 1.8 million hectares of plantations, primarily Radiata pine. Much of the plantation estate was established prior to 1990 and therefore does not qualify for carbon accounting and crediting under the Kyoto Protocol rules. The Kyoto forestry rules caused substantial consternation in the New Zealand forestry sector, as most major corporations owned non-Kyoto forests, while small investors who entered the market after 1990 own most of the Kyoto compatible estate.

The New Zealand Government attempted to introduce a fee on the agriculture sector to support research into reducing methane emissions from animal husbandry. Quickly dubbed a ‘fart tax’, the measure attracted worldwide notoriety. With the forestry sector divided and confused over the value of their forestry carbon, and the agriculture sector demanding to be excluded from any costs associated with Kyoto ratification, the Government found it politically attractive to nationalize the carbon credits from forestry as an offset to the agriculture emissions. In effect the Government gained a carbon asset worth approximately \$2 billion, putting the national carbon accounts into a surplus for the first Kyoto commitment period and removing any need to regulate the agriculture sector.

The forestry sector was offered a series of provisions to support forest industry development as a peace offering, but it has continued to express a mix of hostility and skepticism to the Kyoto Protocol. In May 2004 the government attempted to offer another olive branch to the forestry sector with the Permanent Forest Sinks Initiative (PFSI). The PFSI will accredit reforestation projects compatible with Article 3.3 of the Kyoto Protocol where the forests will not be commercially harvested for at least 35 years, and any timber harvesting will be on a ‘continuous forest canopy’ basis. The forestry areas accredited under this program will need to be protected under a land title covenant that is governed by an approved harvesting plan. This approach is well-suited to reforestation of native species but is also an attractive option for long-lived exotic species like Douglas-fir and Redwood.

The Government intends to create private accounts under its Kyoto Protocol registry and allocate Assigned Amount Units equal to the sequestration in accredited forest areas to those accounts. Given the potential value of these AAUs, it is likely that

¹³ See the Australian Financial Markets Association at <http://www.afma.com.au> for further details. The AFMA Environmental Products Working Group has devised documentation for spot and forward trading of renewable energy certificates and Australian state-based greenhouse gas emission reductions. These contracts can be found at <http://www.afma.com.au/scripts/runisa.dll?AFMA.852988:LISTRIGHT:1363470039:pc=ENVIROPRDS>.

¹⁴ See the Next Generation Energy Solutions at <http://www.nges.com.au/> for further details.

substantial areas of commercial forestry will be shifted to management approaches compatible with the PFSI. In fact, much of the forestry estate is currently considered commercially marginal due to a high New Zealand dollar (international log prices are quoted in US dollars) and due to a tripling in the shipping cost for log exports (owing to the extraordinary Chinese natural resource import boom). Many forestry areas were being converted back to agriculture, but the PFSI may substantially shift the economics of marginal plantation areas to carbon sequestration.

The EU Emissions Trading Regime

The European Union implemented a comprehensive emissions trading regime, regulating over 14,000 emitting installations in January 2005. The EU Allowance market has grown steadily. In the first six months of the program, approximately 60 million Allowances have been sold (each EU Allowance permits the emission of one tonne of carbon dioxide equivalent). The EU trading system has two phases—a pre-Kyoto phase of 2005-2007 and a second phase linked to the Kyoto commitment period (2008-2012). The price of allowances has increased from approximately 6 Euros per Allowance to 17 Euros in the initial months of the market. Given that the United States and other developed countries have not implemented similar regulations on greenhouse gas emissions, there will be continuing debate over the impact of the scheme on the competitiveness of European business.

The EU scheme includes a ‘linking directive’ that allows credits from JI and CDM projects to be converted to EU Allowances.¹⁵ Forestry-based credits are currently prohibited in the scheme, but there is continuing discussion over the use of forestry credits during the second phase of the scheme. If the price of EU Allowances remains high, look for EU Governments to seek greater flexibility and supply of offsets, potentially also including forestry in the mix.

California Climate Action Registry and Forestry Protocols

California enacted legislation for a voluntary greenhouse gas registry in 2000. The registry does not penalize or restrict emissions but provides transparency in emissions and a rigorous basis for businesses to work toward voluntary greenhouse gas emissions reductions. Much like the NSW scheme above, many observers feel that the registry is a first step towards the ultimate regulation of greenhouse emissions in the state. The scope of the registry, however, is much wider than the NSW GGAS scheme, as it includes all emissions from all sectors, including transport, energy and industrial emissions.

In 2002, the Government of California passed an Act authorizing the establishment of Forest Protocols, which would allow emissions and sequestration in forests to be accounted for and registered.¹⁶ The California protocols depart from the Kyoto Protocol rules by allowing three forms of offsets to be registered. These include reforestation, improved forest management and avoided deforestation. The improved forest management provisions allow for registration of carbon stocks in forests that

¹⁵ See http://europa.eu.int/comm/environment/climat/emission/pdf/dir_2004_101_en.pdf for more information on the EU Linking Directive.

¹⁶ See the California Climate Action Registry Forest Protocols at <http://www.climateregistry.org/PROTOCOLS/FP/> for further details.

exceed the minimum standards for forestry practices in California. The avoided deforestation provisions relate to areas that would otherwise have been cleared for development. All areas registered must be protected by a permanent forestry easement restricting the future use of the land. Timber harvesting is allowable within improved forest management projects according to the approved Forest Practices Code and within the provisions for the carbon stock registered.

The Forest Protocols are a comprehensive system including detailed accounting rules, accreditation requirements for verifiers and registration procedures. The Protocols initially sought to also include carbon sequestered in harvested wood products from accredited forests, but this provision proved controversial and was made optional for reporting. The Protocols were approved in November 2004. Pilot registration projects are currently being developed to test and fine-tune the rules. As the California registry is not yet linked to an emissions reduction requirement or emissions trading scheme, there is no trading or sale of the credits at this time. Nonetheless, it is likely that the growing push to regulate greenhouse gas emissions will begin to create value in these forests and attract both forest owners and investors to make use of the provisions of the Forest Protocols.

Retail Forestry Offset Programs

Another driver for forestry offsets is the growing trend by a group of new businesses to offer retail carbon offsets directly to consumers. Companies such as Future Forests in the UK,¹⁷ Greenfleet in Australia,¹⁸ PrimaKlima in Germany,¹⁹ and Environmental Synergy in the United States²⁰ are offering carbon offsets as either a commercial or not-for-profit service to retail and corporate customers. These companies are seeing rapid market growth with service-oriented clients such as car rental companies, airlines, banks and energy companies. These companies will plant trees that will absorb current greenhouse emissions from transport, energy or airline travel over the life of the trees planted. These companies often do not follow the Kyoto carbon accounting rules.

The Chicago Climate Exchange

Established as the first private sector-led, voluntary greenhouse gas market, the Chicago Climate Exchange (CCX)²¹ was established in December 2003. The market is based on voluntary commitments by approximately 30-40 corporations and governments. Carbon Financial Instruments (CFIs) are traded and are equivalent to one tonne of carbon dioxide equivalent. The scheme includes forestry credits from reforestation in the United States and Brazil. It also recently announced that it would allow registered forestry offsets from the California Climate Action Registry. The Brazilian forestry company, Aracruz recently announced that it will bring offsets into the CCX from its commercial forestry plantations in Brazil. The CCX has started slowly, with pricing of between \$US1 and \$US2 per tonne of carbon dioxide, and

¹⁷ See Future Forests at <http://www.futureforests.com/> for further details.

¹⁸ See Greenfleet at <http://www.greenfleet.com.au/> for further details.

¹⁹ See Prima Klima at <http://www.prima-klima-weltweit.de/> for further details.

²⁰ See Environmental Synergy at <http://www.environmental-synergy.com/> for further details.

²¹ See Chicago Climate Exchange at <http://www.chicagoclimatex.com/> for further details.

volume has been in the thousands of tonnes per week, versus millions of tonnes per week in the EU scheme.

Other Initiatives in Development

The regulation of greenhouse gas emissions is expanding and diversifying around the world. State Governments in the United States are taking a number of initiatives, including a process to establish a Regional Greenhouse Gas Initiative in the Northeast US that will include forestry offsets.²² This market is expected to develop over the next two years. The State of Georgia has followed California in passing legislation enabling the creation of a forestry carbon offset registry, and Oregon has recently undertaken a consultation and policy development process related to greenhouse gas emissions.

Conclusion

While the world struggles to find an acceptable international framework for greenhouse gas regulation, myriad public regulations, private sector initiatives and carbon-related investment programs are emerging. While the overall carbon market increasingly looks like a messy, complex and inefficient system, it will evolve. This evolution will create a growing likelihood for standardization in carbon products and pricing and fungible market instruments.

Forestry credits are in their infancy as an instrument to address climate change, but rapid progress is occurring, and many markets are encouraging forests offsets. How this impacts forest conservation and reforestation is still questionable. Time will tell whether the carbon market serves as an effective force to reverse the current loss and degradation of forests.

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²² See Regional Greenhouse Gas Initiative at <http://www.rggi.org/> for further details. See also Eric Rosenbaum, "Carbon Offsets Take Center Stage in US Northeast," Ecosystem Marketplace, February 28, 2005, http://ecosystemmarketplace.net/pages/article.news.php?component_id=1056&component_version_id=1881&language_id=12.