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Carbon Forest Markets and the Brazilian Atlantic Rainforest: Can Market-Based Economic Incentives Save the Forest?

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1. Introduction

Global climate change is the most serious threat currently facing humanity. Although the increase in the Earth's temperate is a natural occurring phenomenon, anthropogenic interference has being speeding up this process at an alarming rate. Eleven out of the twelve years from 1995-2006 are among the twelve warmest years in record.[1] Increases in sea level, decreases in snow and ice, alteration in rainfall patterns, changes in the frequency and intensity of extreme whether events are some observed causes linked to global warming. The causation between human activities and global warming is established by the increase in greenhouse gases ("GHG") emissions coming from growing energy demand, transport, industry, deforestation and agriculture sectors. Greenhouse gases are so called because while they allow sunlight to come through the atmosphere, they trap the heat produced thereof impeding it from being released back out of the Earth.

In comparison with pre-industrial levels, concentration of carbon dioxide ("CO_2") in the atmosphere increased from 280 parts per million ("ppm") to 379 ppm in 2005.[2] CO_2 is the main anthropogenic greenhouse gas. Higher concentrations of GHGs in the atmosphere have rise to a point that led the Intergovernmental Panel on Climate Change ("IPCC") to conclude that "[m]ost of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic GHG concentrations."[3] In that sense, regulating human activities worldwide to address the threats due to global climate change is the major challenge facing the international regime launched by the United Nations Framework Convention on Climate Change ("UNFCCC") in 1992.

Because over half of the anthropogenic greenhouse gases emissions come from the energy, industrial and transportation sectors, international policy efforts have concentrated with more emphasis on diminishing fossil fuel consumption through

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[1] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC'S FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007: SYNTHESIS REPORT 30 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC Fourth Assessment Report].

[2] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC'S FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007: SYNTHESIS REPORT 37 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC Fourth Assessment Report].

[3] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC'S FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007: SYNTHESIS REPORT 39 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC Fourth Assessment Report].

investment in alternative sources of renewable energy. In addition, recognizing that these sectors are the main drivers of industrialization - a process until very recently restricted to developed countries - the climate change regime focused throughout the 90s on trying to impose quantified emission reductions and commitments upon those most industrialized nations. That was partially accomplished with the international community agreeing upon the Kyoto Protocol to the UNFCCC in 1997 and, more importantly, with its entering into force in 2005.

However, the 90s also experienced alarming rates of tropical deforestation which is another major source of greenhouse gas. That drove international attention to a problem that went beyond the impairment of natural ecosystem services related to forests, including, but not limited to, maintaining biodiversity, regulating hydrological cycles and local climate patterns, protecting water and land resources, serving as recreational and spiritual refugees, alleviating poverty and improving air quality. Considering that the amount of carbon stored in forest biomass and soil currently outweighs the total amount of carbon in the atmosphere, growing rates of deforestation impose just a serious of a threat than the burning of fossil fuels.[4] As a consequence, attempts of holding developed countries accountable for forestry practices domestically and jointly - with another developed and/or developing country - marked the climate change regime negotiation process.

In addition, growing international consensus over developing countries' taking on quantified and concrete commitments of some sort in light of the rapid industrialization process some of them are currently undergoing (i.g. China and India) or due to increasing rates of tropical deforestation verified in others (i.g. Brazil and Indonesia) is contributing to expand the role forest and forestry practices are likely to play in a post-2012 climate agreement. 2012 is when the first commitment period of the Kyoto Protocol is set to end. Negotiations over a post-2012 agreement are expected as the outcome of the forthcoming Conference of the Parties in its fifteenth session to be held in Copenhagen at the end of 2009. Moreover, growing private investments in the forestry sector has been indicative of the increasing perception of the importance of

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[4] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, Executive Summary, xvi, xvii (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*] ("It is estimated that the world's forests store 283 gigatonnes (Gt) of carbon in their biomass alone, and that the carbon stored in forest's biomass, dead wood, litter and soil together is more than the amount of carbon in the atmosphere.").

promoting forest conservation and regeneration practices as an essential climate change mitigation strategy.

Effective protective forest regulation has been traditionally a great challenge for various reasons. Up until when scientific knowledge effectively started to establish causation between unsustainable forestry practices and increasing global temperatures, forest resources and its related ecosystem services were dealt domestically as part of any country's right to exploit its own natural resources. Because domestic legal frameworks traditionally have not recognized the value of a forest's ecosystem services beyond just those commercially tradable goods such as timber and the land itself, a perverse deforestation incentive prevailed over conservation and regeneration practices. That started to change in the early 90s with the release of alarming rates of deforestation and the tighter link with a global environmental problem: climate change. After the Rio Summit in 1992, the Parties had finally realized that deforestation was no longer a problem of domestic significance, but rather, it was affecting negatively the entire world.

Along with attempts to address global warming by expressly including the promotion of sustainable forestry practices in the 1992 UNFCCC, the Parties agreed upon the 1992 Conventions on Biological Diversity ("CDB") and to Combat Desertification ("CCD"); the non-legally binding forest principles of the United Nations Conference on Environment and Development ("UNCED"); Chapter 11 of Agenda 21; and the conception of the United Nations Forum on Forests ("UNFF") in 2000. Those are all illustrative of the solidification of international consensus throughout the 90s that additional forest ecosystem services are a matter of common concern of humankind. They were also important in fostering domestic protective forest legal frameworks recognizing those priceless ecosystem services. Although the 2005 Global Forest Resource Assessment of the United Nations Food and Agriculture Organization ("FAO") identified worldwide progress in slowing down deforestation for the period 1990-2005, in developing countries deforestation rates are still high.[5] Not surprisingly, Brazil itself accounts for 24% of the total net loss in the period.[6]

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[5] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, Executive Summary, xiv, (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[6] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, Executive Summary, xiv, (FAO Forestry Paper 147, 2006), *available at*

In light of the failure of this non-binding set of international policies and even of the emergence of domestic forest protective legal frameworks, economic forest market incentives can offer an ultimate hope to save the remaining world's forest stocks while also promoting regeneration practices. Essentially, what the climate change regime and parallel voluntary initiatives are attempting is to market a forest's carbon sequestration potential and other ecosystem services by attributing them a price and putting into place a property right regime upon credits arising thereof. Unfortunately, though, more active international involvement and domestic action aimed at saving the forests worldwide came too late for one of the world's most important forested ecosystems: the Brazilian Atlantic Rainforest.

Since the first wave of European explorers have discovered and settled on the region comprising the Atlantic Rainforest more than five hundred years ago, the biome underwent major transformation. From intense lumbering, natural resources' exploitation, unsustainable agriculture practices and, more recently, a growing industrial demand, very few preserved areas still remain. Consequently, on one of the most biodiverse biomes on Earth that is over twice the size of France, only 7.26% remains preserved[7] and upon which hope currently lies on a domestic command-and-control regime that has proven insufficient to curb deforestation practices. Socio-economic challenges such as demographical pressure and growing agriculture and industrial demands contribute even further for the failure of the command-and-control regime currently in place.

It is against this ecological and socio-economic background that this study takes the Brazilian Atlantic Rainforest biome as a case study to analyze whether existing market-based economic incentives can assist on maximizing the forest's protective legal framework in place. But first, understanding forests in the global context is useful to differentiate and identify the Brazilian Atlantic Rainforest's ecological and socio-economic particularities. An overall trend can influence the conceptual nature of different economic instruments. For areas that still preserve large stocks of primary forest, a market-based tool valuing ecosystem services in the format of crediting avoided deforestation practices is better suited. On the contrary, for

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ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[7] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

forested areas under advance stages of degeneration and deforestation, market-based incentives that are not limited to valuing those remaining protected areas, but that also include crediting from regeneration, reforestation and afforestation activities is preferable.

Under the international climate change regime, a regulatory forestry market-based economic incentive was introduced by the 1997 Kyoto Protocol. Of relevance to the case study of the Brazilian Atlantic Rainforest proposed by this study, the Parties agreed upon the Clean Development Mechanism ("CDM") which is a market-based incentive allowing developed countries to invest in greenhouse gas offsetting projects in developing countries. However, after a contentious negotiation process, the Parties decided to limit the scope of allowable forestry activities under the CDM to human-induced afforestation/reforestation projects. Conflicting interests ranged from the fear that cheap forestry credits could undermine domestic action towards curbing greenhouse gases emissions to apprehension that conservation projects could bring about a new form of colonialism, the so-called eco-colonialism. One that would allow developed countries to buy forested areas in developing countries and thus interfere directly with their development goals. In addition, strict set of technical rules was put into place to assure that forests underlying issued carbon credits were not disturbed and did not lead to deforestation elsewhere undermining the credibility of the forest carbon market. As a result, in comparison with energy efficiency and renewable energy project-activities, forestry projects in the regulatory market are significantly underutilized and have not been proposed to a point that can positively impact the problem of global warming.

One the flip side, another major consequence of an over bureaucratic set of rules and policies for forestry project under the regulatory CDM market, an increased number of voluntary initiatives started to rise. For different reasons, including merely philanthropy or promoting corporate environmental and social responsibility, private entrepreneurs started to invest voluntarily in parallel forest projects. Because under those voluntary initiatives no set of binding rules apply, projects ranged from an array of conservation, regeneration and reforestation/afforestation activities. Envisioning benefits beyond just climate change mitigation, important not-for-profit organizations started to develop standards for certification of additional ecosystem services. Albeit still limit in absolute numbers voluntary forestry projects are growing exponentially. This study examines these voluntary initiatives in light of the existing Atlantic forest's

legal framework to conclude that they can also assist on maximizing the efficacy of the current command-and-control regime.

Along with the growing international pressure for some key developing countries to take on some sort of concrete binding commitments under the climate change regime, the increasing carbon forest market triggered attempts to expand the scope of current allowable forestry activities for the post-2012 period. Developing countries would be permitted to participate by hosting not only afforestation/reforestation projects, but would also by being accountable and participating with reducing emissions from forest degradation and deforestation ("REDD"). The benefits are just as promising as the challenges facing the inclusion of REDD activities into the climate change legal regime. Depending on how the rules of REDD are negotiated, biomes with higher rates of primary forest, such as the Amazonian one, tends to take more advantage than the already degraded Atlantic Rainforest one. However, even if restricted to those last remaining areas of primary Atlantic forest or to those under advanced degree of degeneration, REDD activities can constitute an important maximization tool to the command-and-control regime currently in place.

In sum, the problem this study aims at examining is whether the current Brazilian Atlantic Rainforest's legal framework is sufficient to promote conservation and regeneration practices. Because only 7.26% of the forest is preserved and deforestation is still happening, this study turns to analyzing whether existing forest market-based economic incentives can assist on maximizing mandatory and/or non-legally binding conservation and regeneration practices. For that, this study takes into consideration: existing political and legal obstacles, technical methodological challenges and the Atlantic Rainforest's ecological and socio-economic hurdles. Finally, whether Brazil's forest legal framework is receptive of auxiliary market-based economic incentives and how it should be construed in light of the rules of the current available regulatory and voluntary carbon markets constitute the core problems examined by this work.

In order to address each of the above stated problems, this study is dived into six main chapters. The first chapter is dedicated to situate forests in the global context and providing a detailed description of the Atlantic Rainforest's history, ecological features, geographical and demographical information and its potential contribution to emissions and removals of greenhouse gases. Considering the traditional trend of not valuing

ecosystem services, this first chapter introduces the notion of economic incentives to promote forest conservation and regeneration policies highlighting existing market-based approaches. The goal is twofold: first, to compare the Atlantic forest's reality and characteristics with a worldwide deforestation trend; second to provide an understanding of the nature of existing carbon forest market schemes and how they operate.

Next, this study presents an overview of the evolution of the forest market-based approaches internationally. Since the CDM of the Kyoto Protocol is the dominant regulatory market influencing various trading schemes around the world, understanding how the international community overcame conflicting interests and technical obstacles to build consensus over such an economic incentive is crucial to identifying its practical implementation challenges. Subsequently, chapter four builds upon the analysis of the previous chapter by laying down the evolution of the CDM's legal and institutional framework. Being able to visualize the legal and institutional framework is critical to understanding the operational and bureaucratic bottlenecks of a CDM forestry project implementation process.

Having stressed down the Atlantic forest's main ecological and socio-economic features and constraints along with the implementation challenges of the dominant carbon forest market, the fifth chapter turns to examining current obstacles to, and impacts of, forestry activities specific to the Atlantic Rainforest biome. Then, this study provides a thorough analysis of the current command-and-control regime governing conservation and regeneration practices in the Atlantic forest. It examines the legal framework in light of the procedural rules of the regulatory market while assessing the maximization potentialities of both voluntary and regulatory carbon forest markets. Before a conclusion can be draw, the final chapter provides policy recommendations to overcome the identifiable obstacles to, and adverse impacts of, carbon forest markets in the Brazilian Atlantic Rainforest.

2. Forests in the Global Context

According to the Food and Agriculture Organization of the United Nations ("FAO"), out of the world's 3.5 billion hectares of forests, currently only 35% remains

primary forests.[8] Primary forests are defined as "forests of native species, in which there are no clearly visible indications of human activity and ecological processes are not significantly disturbed."[9] Almost half the world's primary forests are in South America.[10] Brazil is by far the country with the largest stocks, accounting for 31%.[11] The next ten countries in this list, account for almost 90% of the world's total areas of primary forests.[12] Albeit alarming, the worldwide and Brazilian averages of remaining primary forest are far higher than that of the Brazilian Atlantic Forest, 7.26%,[13] which makes it one of the most threatened forests in the world.[14] The table and figure below borrowed from the 2005 FAO Global Forest Resources Assessment illustrate these data:

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[8] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, 41 (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[9] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, Executive Summary, xv, (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[10] Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, 41 (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[11] Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, 41 (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[12] Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, 41 (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[13] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008)

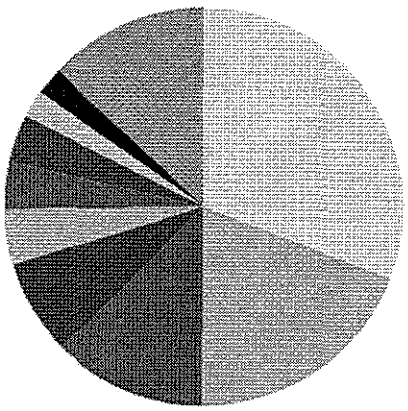
[14] *See* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 144 (Beto Ricardo and Maura Campanili eds., 2008) (stating that after the Madagascar forests, the Atlantic Rainforest is the most endangered in the world).

Area of primary forest 2005

Region/subregion	Information availability			Area of primary forest (1 000 ha)	Primary forest as % of total forest area	
	Countries reporting	Forest area (1 000 ha)	% of total forest area		Average	Range
Eastern and Southern Africa	18	214 589	94.7	12 241	5.7	0-81
Northern Africa	12	117 193	89.4	13 919	11.9	0-20
Western and Central Africa	17	99 566	35.8	11 510	11.6	0-45
Total Africa	**47**	**431 347**	**67.9**	**37 669**	**8.7**	**0-81**
East Asia	5	244 862	100.0	21 808	8.9	6-46
South and Southeast Asia	17	283 126	100.0	62 908	22.2	1-100
Western and Central Asia	23	43 579	100.0	2 810	6.4	0-72
Total Asia	**45**	**571 567**	**100.0**	**87 526**	**15.3**	**0-72**
Total Europe	**36**	**983 907**	**98.3**	**263 948**	**26.8**	**0-32**
Caribbean	12	4 090	68.5	60	1.5	6-59
Central America	7	22 411	100.0	9 139	40.8	2-70
North America	4	677 464	100.0	302 456	44.6	34-53
Total North and Central America	**23**	**703 965**	**99.7**	**311 656**	**44.3**	**2-70**
Total Oceania	**11**	**203 455**	**98.6**	**35 275**	**n.s.**	**n.s.-89**
Total South America	**12**	**783 827**	**94.3**	**601 689**	**76.8**	**10-96**
World	**174**	**3 678 069**	**93.1**	**1 337 763**	**36.4**	**0-100**

Source: 2005 FAO Global Forest Resources Assessment

FIGURE 3.3
Ten countries with largest area of primary forest 2005
(%)



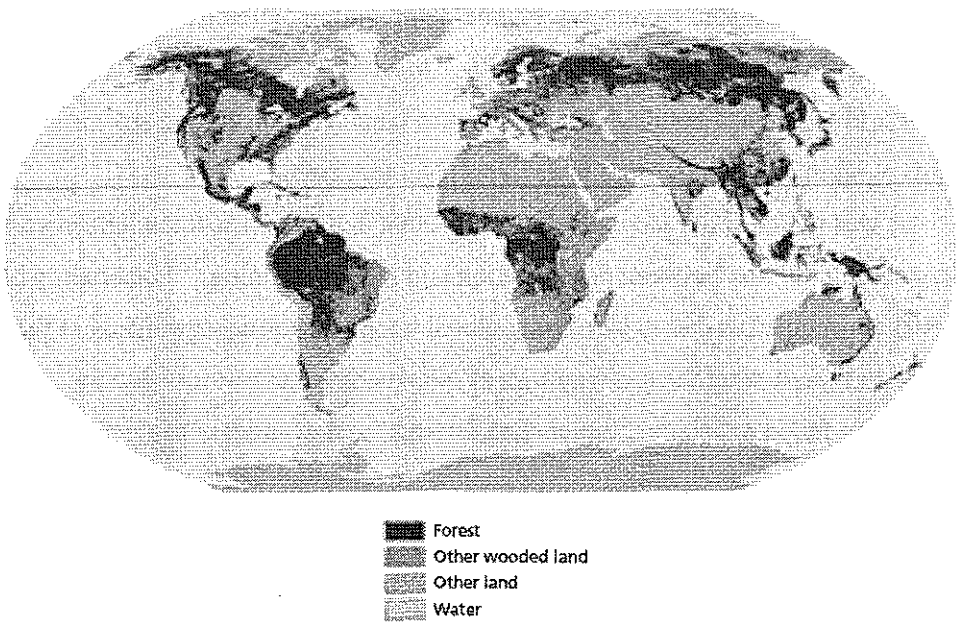
Brazil	31
Russian Federation	19
Canada	12
United States	8
Peru	5
Colombia	4
Indonesia	4
Mexico	3
Bolivia	2
Papua New Guinea	2
Remaining countries	11

Source: 2005 FAO Global Forest Resources Assessment

The main cause of forest loss is deforestation due to growing agricultural demand. Although forested areas continue to disappear, the 2005 FAO Global Forest Resource Assessment reveals that the rate of net forest loss is slowing down. According to this report, the trend can be attributed to "forest planting, landscape restoration and

natural expansion of forests".[15] Of importance to this study though the report does not mention whether the evolution of worldwide economic incentives as instruments of environmental policy are also underlying causes of decreasing deforestation rates. Within the South American context, deforestation rates do not accompany this worldwide trend. To the contrary, deforestation rates in the continent are increasing. South America is leader in forest loss accounting for 4.3 million hectares per year.[16] The figure below reveals the location of remaining forested areas worldwide.

FIGURE 1
The world's forests



Source: 2005 FAO Global Forest Resources Assessment

This overall panorama of forest loss around the world is crucial to raising policy-makers attention in light of different socio-economical and environmental

[15] Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, xii (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

[16] Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, xii (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*].

services provided by forests.[17] Forests are not only essential to serving as carbon sinks and reservoirs of carbon dioxide ("CO_2"). They also serve as sources of food, fiber and fuels, are essential to preserving watersheds, regulating hydrological cycles and local climate, along with their invaluable aesthetic and biodiversity attributes.[18] Not to mention, economically measurable goods such as timber and products thereof.

However, because those aforementioned ecosystem services attributed to forests were traditionally of local concern[19] and considering forests fall within national territories, losses of forests were essentially a domestic problem in a battle fought between conservationists and developers.[20] In the beginning of the 1900s, for instance, conservationists alerted that destruction of the Brazilian Atlantic Rainforest was extending the dry season, increasing regional temperature extremes and reducing rainfall patterns.[21] International preoccupation was restricted to non-profit organizations with a worldwide reach but it was insufficient to launch action among sovereign nations towards agreeing upon a transnational forest legal regime.

It was not until the second half of the 1900s that scientific knowledge evolved to understanding the link between deforestation and global warming.[22] Uncertainty of the potential consequences due to increasing global temperatures accomplished in the international arena what the growing loss of other ecosystem services due to deforestation failed to achieve. It launched international awareness to a problem that

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[17] *See* Manuel Estrada Porrua and Andrea García-Guerrero, *A Latin American Perspective on Land Use, Land-Use Change, and Forestry Negotiations under the United Nations Framework Convention on Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 209, 211 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Although national circumstances vary widely, in most Latin American countries forests are valued highly for their environmental, social, cultural and economic benefits.").

[18] World Resources Institute [WRI], *Ecosystems and Human Well-Being: Biodiversity Synthesis*, III (2005), *available at* http://www.millenniumassessment.org/en/Synthesis.aspx [hereinafter *Biodiversity Synthesis*].

[19] *See* Manuel Estrada Porrua and Andrea García-Guerrero, *A Latin American Perspective on Land Use, Land-Use Change, and Forestry Negotiations under the United Nations Framework Convention on Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 209, 213 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (noting that in Latin America, large human populations "are heavily dependent on forests for food, particularly in tropical South America. Changes to forests therefore affect people's quality of life and their social and cultural customs directly and sometimes dramatically.").

[20] A pioneer multilateral agreement dating back to 1979 recognizes deforestation and changes of land use are a major cause of increasing concentrations of carbon dioxide ("CO_2") in the Atmosphere. *See* World Climate Conference, Geneva, Switz. Feb. 12-23, 1979, *Declaration of the World Climate Conference*, at 2, U.N. DOC. IOC/SAB-IV/INF.3 [hereinafter *Declaration of the World Climate*].

[21] WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 242 (U. Calif. Press 1995) (1995).

[22] *See* World Climate Conference, Geneva, Switz., Feb. 12-23, 1979, *Declaration of the World Climate Conference*, at 2, U.N. DOC IOC/SAB-IV/INF.3 (constituting one of the first international agreements recognizing the scientific work linking deforestation practices and increasing global temperatures).

was no longer of local concern. Because forests could act both positively and negatively to mitigating or contributing to climate change, respectively, the international community started to pay closer attention to the problem. That eventually led to international action resulting in the inclusion of forests in different multilateral environmental agreements as a problem that had to constitute a common concern of humankind in spite of the sovereignty right principle upon this precious natural resource.[23] The following section is dedicated to demonstrate how scientific knowledge evolved to linking forest and forestry practices to global climate change.

a. The Science Linking Forest and Forestry Practices to Global Climate Change

Of the six greenhouse gases regulated by the climate change legal regime, CO_2 is the most common one.[24] Other gases and group of gases include: methane ("CH_4"), nitrous oxide ("N_2O"), hydrofluorocarbons ("HFCs"), perfluorocarbons ("PFCs") and sulphur hexafluoride ("SF_6").[25] All of these other gases are measured in CO_2 equivalent according to their greenhouse potentials.[26] Global warming potentials for each of the regulated gas and group of gases are defined by scientific work compiled by the

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[23] Forests were featured, for instance, in the 1992 UNFCCC, the 1992 Conventions on Biological Diversity ("CDB") and to Combat Desertification ("CCD"); in the non-legally binding forest principles of the United Nations Conference on Environment and Development ("UNCED"); in Chapter 11 of Agenda 21; and in the conception of the United Nations Forum on Forests ("UNFF") in 2000. *See* Convention on Biological Diversity, UNEP, June 5, 1992, pmbl., 31 I.L.M. 818, 822 [hereinafter Convention on Biological Diversity] ("*Affirming* that the conservation of biological diversity is a common concern of humankind.").

[24] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC'S FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007: SYNTHESIS REPORT 36 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC Fourth Assessment Report] ("Carbon dioxide (CO_2) is the most important anthropogenic GHG [greenhouse house gas].").

[25] Kyoto Protocol to the United Nations Framework Convention on Climate Change, Annex A, Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[26] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC'S FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007: SYNTHESIS REPORT 36 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC Fourth Assessment Report] ("*CO_2-equivalent emission* is the amount of CO_2 emission that would cause the same time-integrated radiative forcing, over a given time horizon, as an emitted amount of a long-lived GHG or a mixture of GHGs. The equivalente CO_2 emission is obtained by multiplying the emission of a GHG by its Global Warming Potential (GWP) for the given time horizon. For a mix of GHGs it is obtained by summing the equivalent CO_2 emissions of each gas. Equivalent CO_2 emission is a standard and useful metric for comparing emissions of different GHGs but does not imply the same climate change responses.").

Intergovernmental Panel on Climate Change ("IPCC")[27] according to article 5.3 of the Kyoto Protocol.[28] For example, one metric ton of CH_4 equals 23 metric tons of CO_2 considering methane has a twenty-three times higher global warming potential than carbon dioxide.[29] Thus, the relationship between forests and CO_2 in the atmosphere is characterized by forests' ability to absorb CO_2, store CO_2, and offset greenhouse gas emissions.[30]

Growing forests and plants, through photosynthesis, have enormous carbon sequestration capabilities. Long established old-growth and mature forests can store significant amounts of carbon for long periods of time.[31] Nonetheless, when disturbed forests no longer play a role in mitigating global warming; rather, they become part of the problem because they turn into a considerable source of CO_2.[32] According to the United Nations Framework Convention on Climate Change ("UNFCCC"), a "source" is "any process or activity which releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas into the atmosphere."[33] Forests will act as sources of CO_2 when the

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[27] *See generally* Intergovernmental Panel on Climate Change ("IPCC") Official Homepage, http://www.ipcc.ch/about/index.htm (last visited Jan. 22, 2009) (containing detailed information on the IPCC's mandate and role within the climate change regime); *see* RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 4 (Earthscan 2007) (2007) ("A group of scientists associated with the Intergovernmental Panel on Climate Change (IPCC) has determined the global warming potential (GWP) of each gas in terms of its equivalent in tons of carbon dioxide (i.e. tCO_2e over the course of 100 years.");

[28] Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 5(3), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[29] RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 4 (Earthscan 2007) (2007).

[30] *See* Pedro Moura Costa & Charlie Wilson, *An Equivalence Factor Between CO_2 Avoided Emissions and Sequestration – Description and Applications in Forestry*, 5 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 51, 51 (2000).

[31] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS 4 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF] (" Newly planted or regenerating forests, in the absence of major disturbances, will continue to uptake carbon for 20 to 50 years or more after establishment, depending on species and site conditions, though quantitative projections beyond a few decades are uncertain."); Hawk Jia, *Old-Growth Forests are "Key Carbon Sinks"* , SCIDEV.NET, Dec. 1, 2006, http://www.scidev.net/content/news/eng/old-growth-forests-are-key-carbon-sinks.cfm (citing a recent study showing that 400-years-old forest in southern China soaks up carbon significantly faster expected).

[32] *See* KENNETH L. ROSENBAUN ET AL., FOOD & AGRIGULTURE ORGANIZATION OF THE U.N., CLIMATE CHANGE AND THE FOREST FACTORS: POSSIBLE NATIONAL AND SUBNATIONAL LEGISLATION 2 (2004), *available at* ftp://ftp.fao.org/docrep/fao/007/y5647e/y5647e00.pdf (" Actively growing trees and other plants capture CO_2 from the atmosphere, combine it with water through photosynthesis and create sugars and more stable carbonhydrates. They may store a significant part of the carbon absorbed for appreciable lengths of time, from years to millennia . . . . Eventually, when plants and animals die, CO_2 returns to the atmosphere. When wood products and other organic materials burn or decompose, they also release CO_2.").

[33] *See* United Nations Framework Convention on Climate Change, art. 1(9), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

ecosystem's capacity to uptake carbon is limited; when the rate of photosynthesis no longer rises with the concentration of CO_2; or when anthropogenic or natural factors cause ecosystem degradation.[34]

In a reflection of this common scientific understanding, the UNFCCC embraced the role of forest conservation practices and called upon all parties to promote, and cooperate in the enhancement of sinks and reservoirs[35] while respecting the principle of common but differentiated responsibility.[36] But since the UNFCCC, negotiations upon an international legal regime recognizing climate change mitigation potentials and threats due to forestry practices and disturbances was fueled by a variety a different conflicting interests examined in deeper details in chapters 3 and 4. In light of the sovereignty barrier facing any attempt upon building legally-binding forestry rules, the forest framework under the UNFCCC emerged from an agreement around the utilization of economic incentives in the format of market-based schemes aimed at promoting forestry practices. Notwithstanding, prior to analyzing the efficacy of this kind of regulatory approach as applied to the Brazilian Atlantic Rainforest, the following section is dedicated to examining the challenges intrinsic to regulating forests in general.

b. Forest Regulation (Command-and-Control Regime and Economic Policy Instruments)

Traditionally, a forested area has been valued for the direct economic goods and services that could benefit an individual and/or the state. Additional social and environmental services were despised.[37] In the past, that was due mainly to the lack of

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[34] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS 4 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].

[35] *See* United Nations Framework Convention on Climate Change, art. 4(1) (d), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[36] *See* United Nations Framework Convention on Climate Change, art. 3(1)., May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC]. *See generally* PHILIPE SANDS, PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW 285-89 (2d ed. 2003) (discussing, in detail, the principle of common but differentiated responsibility).

[37] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 242 (U. Calif. Press 1995) (1995) (describing that with respect to the Atlantic Rainforest, "[n]early all of those scientists and public figures who adopted conservationist positions despaired of the average citizen's indifference or hostility toward the natural environment.").

scientific certainty linking additional ecosystem services to human vital needs.[38] Consequently, a general legal system of public concessions and private property was sufficient. Thus, whenever a forest was seen as an insurmountable obstacle to development it was simply cleared or converted into agricultural use. Because forested areas were once abundant and population density rather low, upon exhaustion of the natural resource or land under exploitation, the area was simply abandoned and more forests were cleared. In many circumstances, this scenario reflects the history of the Atlantic Rainforest.[39]

As scientific knowledge evolved to recognizing ecosystem services (social and environmental) inherited to forests, the need for state intervention through regulation emerged.[40] And that was based on a fundamental premise: in the absence of a legal framework capable of recognizing social and environmental services by imposing restrictions upon forest exploitation, decisions are likely to prioritize exhaustion for rapid and maximum benefits.[41] The logic is that without a price for ecosystem services, private landowners bear conservation and regeneration costs and society shares the benefits.[42]

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[38] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 243 (U. Calif. Press 1995) (1995) ("Conservationist arguments were often based on nothing more than impressionistic observations, which pro-developmentalists confronted with impressionistic observations of their own.").

[39] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 243 (U. Calif. Press 1995) (1995) ("It was a major cause of the destruction of the Atlantic Forest that the government assigned no value to the land it so freely granted. Having consumed all the most promising primary forest in a given sesmaria, a grantee commonly sold it off for a trifle and asked for another, which he normally experienced no difficulty in obtaining.").

[40] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 13 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Whereas the private benefits of forest exploitation are valued through the market, social benefits are not valued in the market without some type of policy intervention.").

[41] *See* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 8 (Kluwer Law Int'l 2004) (2004) (stressing that "[a] major impediment to the adoption of sustainable forest management, particularly by forestry companies based or with forestry operations in developing countries, is the costs associated with the adopting such practices. . . ." Therefore, "the development of alternative sources of finance for forestry companies that have the potential to reduce sharply the funding costs of those companies is of considerable significance.").

[42] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 13 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("For many situations the market economy works well and provides the socially optimal level of goods and services. Yet for many other situations, such as the consumption of natural resources, market systems have led to excessive and unsustainable extraction. The reason many natural resources are not traded efficiently in market systems is that they do not meet two crucial conditions necessary for a market outcome to be efficient: the good or service should be private rather than public, and there should be no difference between the private and social costs of producing the good or service.").

Mutatis mutandis, in a different scale, this premise is also valid for the relationship between countries with large forested areas and those with little or none.[43] Whereas the sovereignty principle in international law is equivalent to private property rights in domestic law systems,[44] conservation and restoration policies in the priors benefit forestless nations or countries with little forest resources.[45] But similarly to what happen on the national level, the costs of social and environmental services are distributed unevenly.[46]

The solution to avoid what would be comparable to the "tragedy of the commons",[47] but for forested areas, seems to be twofold: 1) a solely based command-and-control regime with laws and regulations recognizing ecosystem services and imposing restrictions upon private proprietors and monitoring techniques for public

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[43] *See* Kenneth Hanf, *The Domestic Basis of International Environmental Agreements*, *in* INTERNATIONAL ENVIRONMENTAL AGREEMENTS AND DOMESTIC POLITICS 1, 14 (Arild Underdal and Kenneth Hanf eds., 2000) (explaining the difficulties in the implementation of international agreements because global environmental problems and the negotiations to address them tend "to penetrate societies in a more pervasive and direct way. They carry potentially high costs for important interests, such as producers and/or consumers of particular goods and services.").

[44] *See generally*, Scott J. Shackelford, *The Tragedy of the Common Heritage of Mankind*, 28 STAN. ENVTL. L.J. 109, 151 (2009) ("Property rights are central to economic growth. It has been empirically demonstrated that the economies of nations which protect property rights grow more rapidly than those that do not. The international commons is no exception to this principle. Without some form of guaranteed property rights, development in the commons will be curtailed eve as technology meaningfully opens up the commons for the first time.").

[45] *See generally*, STEPHEN J. DECANIO, ECONOMIC MODELS OF CLIMATE CHANGE – A CRITIQUE 8 (Paulgrave Macmillan 2003) (2003) (noting that "[t]he distribution of rights across generations, and within different groups of people presently alive (rich or poor in the United States, for example, or North or South in the world) is so important that prices, interest rates, incomes, and welfare all depend on the way the rights are allocated.").

[46] *See* STEPHEN J. DECANIO, ECONOMIC MODELS OF CLIMATE CHANGE – A CRITIQUE 12 (Paulgrave Macmillan 2003) (2003) ("Today, the human impact on the climate (and the natural world more generally) has become massive and measurable. The consequences are severe, both in terms of likely future damages and in terms of the risk of catastrophic surprises. . . . If and when governments begin to address the consequences, and assign various kinds of environmental or climate rights to people (including future potential victims of climate change), the result will be a change in the allocation of wealth. This reallocation will significantly affect the outcome of market processes.").

[47] *See generally* Scott J. Shackelford, *The Tragedy of the Common Heritage of Mankind*, 28 STAN. ENVTL. L.J. 109, 118-119 (2009) ("The concept of a tragedy of the commons was first proposed in 1833 by William Forster Lloyd, a fellow of the Royal Society, and was later popularized by Garrett Hardin. The theory suggests that unrestricted access to a resource ultimately dooms the resource to over-exploitation. Hardin concluded that there was no foreseeable technical solution to increasing both human populations and standards of living on finite planet, stating, 'Freedom is the recognition of necessity.' He suggested that 'freedom,' (i.e., the freedom to do as one pleases), is ultimately responsible for the tragedy of the commons. But overexploitation is not the only tragedy. Continued economic growth and resultant poverty alleviation requires new resources that may increasingly be found in the international commons. By recognizing resources as commons, and by agreeing that they require management, Hardin believes that we can preserve and nurture other more precious freedoms. Thus finding a solution to resource competition requires recognizing the necessity of preservation and responsible management through international cooperation to avoid both over- and under-exploitation.").

forests.[48] The downside is that such system only operates efficiently with strong institutions capable of promoting and putting in place compliance and enforcement mechanisms.[49] Paraphrasing Tientenberg on this issue, "[o]ne of the insights derived from the empirical literature is that traditional command-and-control regulatory measures, which depend upon government agencies to define not only the goals but also the means for reaching them, are in many cases insufficiently protective of those resources or economically inefficient."[50] And 2) a command-and control regime mixed with economic policy instruments to balancing individual costs and collective social and environmental benefits.[51] A third approach would be taxing emissions regardless where they originate from (i.e. fossil fuel, land-use, forestry, etc).[52] However, because at least presently this option is being left out from international and domestic policy initiatives, this study will focus in the prior two.

Economic policy instruments of relevance to this study are those market-based.[53] They operate basically by pricing ecosystem services and thus creating a market for them. This is an approach that faces moral and ethical opposition.[54] Although extreme valid concerns, these are considerations falling outside the scope of this study. Because

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[48] *See* Kenneth Hanf, *The Domestic Basis of International Environmental Agreements*, *in* INTERNATIONAL ENVIRONMENTAL AGREEMENTS AND DOMESTIC POLITICS 1, 5 (Arild Underdal and Kenneth Hanf eds., 2000) (noting that "[l]ike domestic society, international society in many areas is characterised by non-hierarchical politics through which joint regulatory actions can be taken to deal with common problems. In such cases obligations do not emanate from a hierarchical norm- and rule-setting process but from voluntary agreements to play by a set of rules which are binding in the sense that the create convergent expectations regarding acceptable govern behaviour."

[49] *See* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 8 (Kluwer Law Int'l 2004) (2004) (comparing the downside of traditional command-and-control systems with market-based instruments, noting that solely-based command-and-control policies "can lead to technology 'freezes', since, once a company has achieved minimum compliance, the policies provide no incentive for that company to seek over-compliance through the adoption of better pollution control technologies.").

[50] T. H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 1 (2006).

[51] *See* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 7 (Kluwer Law Int'l 2004) (2004) ("Market-based instruments are seen as having two key advantages over traditional command-and-control policies: cost-effectiveness; and technological innovation. They give companies a strong economic incentive not only to adopt the most cost-effective means of achieving minimum compliance but also to exceed those minimum requirements. . . .").

[52] G. CORNELIS VAN KOOTEN, CLIMATE CHANGE ECONOMICS 96 (Edward Elgar Publishing Limited 2004) (2004) (noting that "the least cost option appears to be that of taxing emissions when they occur, whether these are emissions from LULUCF activities or fossil fuel burning, and providing a subsidy of the same amount as the tax when carbon is sequestered through some sink activity.").

[53] *See generally* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 8-9 (Kluwer Law Int'l 2004) (2004) (listing the different formats economic market-based incentives can take).

[54] *See generally* Jozef Keulartz, *Kyoto and the Ethics of Flexibility*, *in* READING THE KYOTO PROTOCOL – ETHICAL ASPECTS OF THE CONVENTION ON CLIMATE CHANGE 117, 117-153 (Etienne Vermeersch ed., 2005) (discussing the moral and ethical issues inherit to emissions trading).

economic instruments for forest conservation and regeneration are widely spread at the local, regional and international level,[55] the following sections concentrate on identifying their specific format and peculiarities to focus on those market-based schemes available and applicable to the Atlantic Rainforest biome.

i. Economic Incentives as Instrument of Forest Conservation and Regeneration Policies

A variety of economic policy instruments for forest conservation and preservation exist.[56] They can take the direct or indirect economic incentive format through the payment for conservation easements and regeneration efforts, or through tax abatement and subsidies, respectively.[57] Ecosystem compensation is another tool upon which some sort of development rights in any given place are tradable for compensation or regeneration efforts elsewhere.[58] Or else, economic policy instruments can take the shape of a market, whereas ecosystem services are valued and, therefore, tradable in temporal and geographic scales just like any other commodity.[59] Ecosystem markets, in turn, are widely spread around the globe in different types and modalities.[60] According

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[55] *See generally* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 21 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (providing a table illustrating existing carbon forest markets at the local, regional and international level).

[56] Note that the origin of economic market incentives as instruments of environmental policy dates back to the early 1970s, when "a group of experts from the academic community familiar with emerging literature on poperty rights suggested that it might be possible to improve upon this system by allowing firms to trade control responsibility among themselves by means of emissions trading. In this way, firms that could control relatively cheaply would voluntarily control more, selling the excess control to those that, for economic reasons, wanted to control less." *See* T. H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 5 (2006).

[57] *See* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 8 (Kluwer Law Int'l 2004) (2004) ("Environmental financing instruments – these include the levying of fees for the provision of environmental services and other instruments for the raising of funds for pollution mitigation or environmental conservation. . . .").

[58] *See* José Marcos Domingues, *Environmental Fees and Compensatory Tax in Brazil*, 13 L. & BUS. REV. AM. 279, 297-298 (2007) (describing environmental compensation under the Brazilian National System of Conservation Units' Act according to which developers that cause forest degradation can compensate it by promoting forest conservation and regeneration in a different area).

[59] *See* J.B. Ruhl and James Salzman, *The Law and Policy Beginnings of Ecosystem Services*, *in* PROCEEDINGS FROM THE SYMPOSIUM ON THE LAW AND POLICY OF ECOSYSTEM SERVICES, 22 J. LAND USE & ENVTL. L. 157, 161-162 (2007) (describing the market and payment for ecosystem services).

[60] According to J.B. Ruhl et al, "[over 280 cases of payments have been documented for forest ecosystem services from around the world, not to mention mitigation markets, subsidy schemes, government competitive payments, etc." *See* J.B. Ruhl and James Salzman, *The Law and Policy Beginnings of Ecosystem Services*, *in* PROCEEDINGS FROM THE SYMPOSIUM ON THE LAW AND POLICY OF ECOSYSTEM SERVICES, 22 J. LAND USE & ENVTL. L. 157, 162 (2007).

to a compilation prepared by Rosimeiry Portela et al., they include, market enhancement, creation and tradable permits.[61]

Market enhancement refers to an array of different environmentally friendly initiatives, voluntarily in nature, aimed at getting financial support for those ecosystem services. These types of initiatives include certification or eco-labeling, marketing for nontimber forest products, sustainable timber management, bioprospecting permits and eco-turism.[62] One main feature of market enhancement initiatives is that they are designed for conservation purposes and therefore presupposes existing forest stocks.

One initiative worth of noticing within the Atlantic Rainforest is the conception in the mid-1990s by the Ministry of Environment of the National Biodiversity Program (PRONABIO). It refers to a market enhancement type of economic incentive related to the principles of the Convention on Biological Diversity. The PRONABIO is based on financial incentives with the objective of fostering conservation practices. This program has already identified key areas for conservation in the Atlantic Rainforest and is serving as an example of policy economic instrument towards the enhancement of the existing command-and-control regime.[63]

Market creation, on the other hand, is based on a system that compensates landowners for conservation and reforestation practices.[64] It is often linked to a trading scheme on which emission allowances are distributed among a close set of participants. By the end of a predefined compliance period of time, each individual's overall emissions shall equal to the amount of allowances distributed upon the beginning of the

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[61] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 16-19 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (listing the different formats of economic forest incentives).

[62] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 16-17 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008).

[63] *See* José Carlos Carvalho, *Policy Initiatives for the Conservation of the Brazilian Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 133, 134 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Since the mid-1990s the Ministry of Environment has been carrying out the National Biodiversity Program (PRONABIO), Brazil's first government program with objectives directly related to the principles set forth in the Convention on Biological Diversity and Agenda 21. The work of PRONABIO starts from the premise that the effective protection, recovery, and sustainable use of Brazilian biological diversity must necessarily depend on measures taken by public organizations and institutions, working both in situ and ex situ as well as on private property. Its mission statement calls for the gathering, systematic compilation, and dissemination of information on biological diversity; the definition and application of instruments for the economic measurement of biological diversity; the implementation of conservation measures both in situ and ex situ; and the promotion use biological resources.").

[64] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 17 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008).

program.[65] Whenever an emission target is set low and participants are not able to reach it within a tradable permitting system, investment on avoided deforestation or afforestation/reforestation projects can be authorized in exchange for credits that can be used to meeting that emission target in the closed trading scheme.[66]

That is the idea behind a carbon market, which translates into "the buying and selling of emissions permits that have been either distributed by a regulatory body or generated by GHG [Greenhouse Gas] emission reductions projects."[67] Thus, a carbon forest market refers to the same idea, but with tradable permits and carbon credits deriving from conservation and reforestation targets and projects, respectively. Like any other economic policy instrument, it is a type of emissions-trading scheme designed to assist a command-and-control regime based on laws and regulations aimed at reducing greenhouse gases emissions and/or valuing other ecosystem services.[68]

The differences within market creation are conceptual. A trading scheme can either take the format of a cap-and-trade program[69] and a project-based market the format of a baseline-credit system.[70] They both can be utilized for ecosystem conservation and restoration, contrary to market enhancement which is driven by conservation activities. Understanding the distinction between the two is crucial for the examination of whether carbon forest markets can be effective auxiliary incentives for successful conservation and regeneration policies for the Atlantic Rainforest.

ii. Cap-and-trade and Baseline-Credit Schemes

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[65] *See* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 12-13 (Kluwer Law Int'l 2004) (2004) (presenting the characteristics shared by closed emissions trading markets).

[66] *See* Dennis Hirsch et al., *Emissions Trading – Practical Aspects*, *in* GLOBAL CLIMATE CHANGE AND U.S. LAW 627, 630-631 (Michael B. Gerrard ed., 2007) (explaining how project-based activities can be allowed in a closed market scheme).

[67] RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 4 (Earthscan 2007) (2007).

[68] *See* T. H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 1 (2006) (noting that emissions trading provides a cost-effective alternative additional to command-and-control regimes and that, "this general approach have spread not only to many different types of pollution in many different countries but are also being used to ration access to many other resources, including fisheries, forests, water, and land use control, among others.").

[69] *See* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 14 (Kluwer Law Int'l 2004) (2004) (explaining how a cap-and-trade system functions).

[70] *See* PAUL A. U. ALI & KANAKO YANO, ECO-FINANCE – THE LEGAL DESIGN AND REGULATION OF MARKET-BASED ENVIRONMENTAL INSTRUMENTS 15 (Kluwer Law Int'l 2004) (2004) (explaining how a baseline-credit system functions).

A cap-and-trade program is based on the regulatory work of an institution with powers to impose caps over different polluters within specific or various sectors of the economy. This regulatory institution can be international, domestic, or even a private organization. Private systems constitute voluntary programs with respect to adhesion, but are contractually binding with respect to compliance.[71] In close systems, corporations meet their reduction commitments at the end of any given compliance period usually through investing in cleaner technologies, or buying available emission allowances from different facilities participating in the program.[72]

Because all the players involved in such cap-and-trade programs enjoy reduction commitments, the system becomes self-regulated. The rationale is quite simple: if a regulated entity oversells its emissions allowances, by the end of the given commitment period it will lack the necessary amount of allowances to meet its own reduction commitments. All in all, the economic attractiveness of overselling emission allowances is undermined by the contractually based penalties inherent to non-compliance.[73]

Such a market-based incentive can also operate for avoided deforestation efforts. An allowance-based program (cap-and-trade) for forest conservation is based on allocation of carbon stocks credits according to a country's amounts of carbon pools accumulated in tropical forests at a defined moment in time. Then, "[a] certain percentage of these credits would have to be held constant within the country, and forest areas would be placed under protection. A quota of the credits would be available for trading among countries to allow for deforestation."[74] This is viewed as the most

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[71] Private regulated cap-and-trade programs are also called "hybrid systems." *See* Dennis Hirsch et al., *Emissions Trading – Practical Aspects*, *in* GLOBAL CLIMATE CHANGE AND U.S. LAW 627, 630 (Michael B. Gerrard ed., 2007) ("Hybrid systems share features of both closed and open-market programs. One form of hybrid system allows entities to 'opt in' to a closed cap-and-trade scheme. Entities that voluntarily choose to opt in are assigned an initial allocation, much as it they had been one of the covered sources to begin with. Thereafter, they have to meet compliance obligations just like any other member of the closed system and are able to transfer and/or acquire allowances from others.").

[72] *See* Dennis Hirsch et al., *Emissions Trading – Practical Aspects*, *in* GLOBAL CLIMATE CHANGE AND U.S. LAW 627, 629 (Michael B. Gerrard ed., 2007) ("Cap-and-trade programs require that at end of a specified compliance period, each facility must hold the rights to enough allowances to cover its emissions for that period. Facilities can meet this requirement by reducing their emissions to the level of their allocation. Or, they can purchase emission permits from other sources that have reduced their emissions below their own allocation and so have excess allowances to sell.").

[73] *See* Dennis Hirsch et al., *Emissions Trading – Practical Aspects*, *in* GLOBAL CLIMATE CHANGE AND U.S. LAW 627, 636 (Michael B. Gerrard ed., 2007) (referring to a pure cap-and-trade program, like the International Emissions Trading of the Kyoto Protocol, for which it "does not need many of the implementation rules common to baseline-credit systems. It contains no certification requirement, no baseline calculation methods, and no additionality mandate.").

[74] Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 25 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008).

promising program to boost conservation efforts worldwide.[75] It is also part of a debate to include in the Kyoto Protocol's forest policy incentives a program allowing for avoided deforestation activities named "reduced emissions from deforestation and degradation" ("REED").[76] Currently, forest conservation practices are not allowed under the climate change regime. Only afforestation and reforestation practices that are human-induced are permitted under the policy incentives created by the Kyoto Protocol.[77]

In a project-based system, no emission limitations or reduction commitments exist. In this kind of program, an entity with emissions reduction targets imposed by a cap-and-trade regime is entitled to acquire or invest in a carbon offsetting project elsewhere, obtaining credits to meet its commitments before an allowance-based scheme.[78] Or else, even if not regulated by a cap-and-trade regime, such an entity shall invest in carbon offsetting projects just for the sake of advertising its pollutant neutral business activity. Whenever that is the case, investment in conservation or regeneration forest projects belong to a voluntary market initiative, rather than as a result of a mandatory economic policy instrument imposed under the format of a regulated market.[79]

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[75] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 25 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("[W]hat holds the greatest promise for cost-effective climate change abatement and forest conservation is allowance-based emissions credits for developing countries that make commitments to reduce deforestation.").

[76] *See* Andrew Schatz, *Discounting the Clean Development Mechanism*, 20 GEO. INT'L ENVTL. L. REV. 703, 733 (2008) ("While no current mechanism offers developing nations credits for preserving forests, parties at Bali agreed to begin work on such a program. The agreement on reducing emissions from deforestation in developing countries (REDD) paves the way for developing countries to receive subsidies for avoided deforestation.").

[77] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II)*, Decision 17/CP.7, ¶ 7(a), U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter *COP-7 Report – Part Two (Volume II)*].

[78] *See* Dennis Hirsch et al., *Emissions Trading – Practical Aspects*, *in* GLOBAL CLIMATE CHANGE AND U.S. LAW 627, 630 (Michael B. Gerrard ed., 2007) ("*Baseline-credit emissions trading programs* do not set an overall cap on emissions or allocate emissions allowances to sources. Instead, they allow sources to earn emission reduction credits by reducing their emissions below a specified baseline. Such system identify a 'baseline' emissions level for each individual sources. They then assign emission reduction 'credits' to those entities that reduce their emissions below their baseline. Firms that obtain such credits can transfer them to other regulated parties who can use them to meet emission limits.").

[79] *See* Katherine Hamilton et al., *Carving a Niche for Forests in the Voluntary Carbon Markets*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 292, 292-93 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("By definition the voluntary carbon markets consist of carbon offset trades that are not required by regulation. These trades include purchases in the rapidly growing retail offset markets, purchases of credits by organizations directly from project developers for retirement or resale, and donations to GHG reduction projects by corporations, which then receive credits.").

However, due to the possibility of credits being used as allowances within a cap-and-trade program, strict rules of "additionality" and "identification of baseline scenarios" are required in baseline-credit schemes. That is the case of the Clean Development Mechanism ("CDM") of the Kyoto Protocol. Because CDM credits can be used within the cap-and-trade regime created for developed countries (emissions trading – "ET"), the offsetting project must demonstrate that the proposed activity is more progressive than what would otherwise happen without the project.[80] But further considerations about the Kyoto Protocol project-based forestry economic incentives are dealt in deeper details in chapters 3 and 4. Prior to that, a panorama of existing forest market mechanisms is draw for the purpose of identifying the ones applicable and better suitable to assist on maximizing the existing domestic command-and-control regime in place for the Atlantic Rainforest.

The idea behind a market mechanism is that it cannot replace strong domestic policies towards ambitious emissions reduction targets.[81] Political will and environmental awar

c. Existing Market-Based Mechanisms for Forest Conservation and Regeneration Practices

The first element to consider when analyzing existing market-based mechanisms for forest conservation and regeneration practices is the characteristics of the forest under examination. Most of what once was the Atlantic Rainforest is now taken by large metropolises, towns, agriculture and industry.[83] The history of the settlement of the Atlantic Rainforest is detailed in the following section. Fact is that only 7.26% of the original forest cover remains preserved.[84] Therefore, while economic policy instruments privileging conservation efforts are of great value for the few remaining primary forested areas, market-based incentives that include commercial or non-commercial reforestation/afforestation and natural regeneration practices are likely to be more promising due to the current stage of deforestation of the Atlantic forest.[85]

Innumerous carbon markets current exist at the local, national and international level with different implementation rules, but they can be divided into two distinct categories examined in deeper details in the following sections: regulatory and voluntary markets.[86] Then, this study turns to comparing the potentialities of both of them aiming at analyzing how conservation and regeneration practices under each of them can be applicable to the Atlantic Rainforest's biome.

i. Voluntary Forest Carbon Markets

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[83] *See* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 153-162 (Beto Ricardo and Maura Campanili eds., 2008) (listing the threats faced by the Atlantic forest, including urban sprawling and high demographic density).

[84] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

[85] *See* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 152 (Beto Ricardo and Maura Campanili eds., 2008) (stressing that most of the few preserved areas of Atlantic forest fall within private property types of conservation units, so-called 'private reserves of natural patrimony').

[86] *See* Katherine Hamilton et al., *Forging a Frontier: State of the Voluntary Carbon Markets 2008*, ECOSYSTEM MARKETPLACE & NEW CARBON FINANCE, 17 (2008) *available at* http://www.ecosystemmarketplace.com/documents/cms_documents/2008_StateofVoluntaryCarbonMarket2.pdf (last visited 31 Mar., 2009) ("In general, the worlwide carbon markets can be divided into two segments: the voluntary markets and the regulatory (compliance) markets.").

Voluntary carbon forest markets are based on an entity's will to invest in conservation or regeneration forest projects to offset its greenhouse gases emissions.[87] They almost always take the format of a project-based market incentive, because voluntary initiatives are not bound by any set of mandatory emissions reduction targets.[88] One exception to this general rule is private cap-and-trade markets on which adhesion to the program is voluntary, but meeting emissions reduction targets is contractually binding.[89]

In fact, one of the first voluntary market initiatives on record dates back to 1989 and it was a forestry project-based one. Sponsored by AES Corporation, the project took place in Guatemala and consisted on "paying farmers in Guatemala to plant 50 million pine and eucalyptus trees on their land. AES, like any other companies since, hoped to reduce its 'carbon footprint' for philanthropic and marketing reasons, not because it was forced to do so by legislation or global treaty."[90] Since then similar projects spanned throughout the globe, including in the Atlantic Rainforest.[91] Due to the lack of regulating institutions, rules under voluntary markets are the ones defined by an entity's will or by any giving voluntary program currently in place.[92] Therefore, projects can

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[87] *See* Katherine Hamilton et al., *Carving a Niche for Forests in the Voluntary Carbon Markets, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 292, 293 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (stating that an entity's (buyer's) will to invest in voluntary markets is driven by "the wish to manage climate change effects, interest in innovative philanthropy, desire for public relations benefits, the need to prepare for (or deter) regulations, and plans to resell credits at a profit.").

[88] *See* Katherine Hamilton et al., *Forging a Frontier: State of the Voluntary Carbon Markets 2008*, ECOSYSTEM MARKETPLACE & NEW CARBON FINANCE, 18 (2008) *available at* http://www.ecosystemmarketplace.com/documents/cms_documents/2008_StateofVoluntaryCarbonMarket2.pdf (last visited 31 Mar., 2009) ("Because this market is not part of a cap-and-trade system, where emission allowances can be traded, almost all carbon offsets purchased in this voluntary market originate from project-based transactions.").

[89] *See* Katherine Hamilton et al., *Forging a Frontier: State of the Voluntary Carbon Markets 2008*, ECOSYSTEM MARKETPLACE & NEW CARBON FINANCE, 17 (2008), *available at* http://www.ecosystemmarketplace.com/documents/cms_documents/2008_StateofVoluntaryCarbonMarket2.pdf (last visited 31 Mar., 2009) ("At the broadest level, the voluntary carbon markets themselves can be divided into tow main segments: the voluntary, but legally binding, cap-and-trade system that is the Chicago Climate Exchange (CCX), and the broader, non-binding, over-the-counter (OTC) offset market.").

[90] *See* RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12 (Earthscan 2007) (2007).

[91] In a project developed by Society for Wildlife Research and Environmental Education ("SPVS") – an Atlantic Rainforest based NGO – in partnership with The Nature Conservancy, American Electric Power, Chevron and General Motors, is promoting conservation and natural regeneration in an area of Atlantic forest of approximately 19,000 hectares. *Projetos Seqüestro de Carbono – Projetos de Ação Contra o Aquecimento Global* [*Carbon Sequestration Projects – Action Projects Against Global Warming*], *available at* http://www.spvs.org.br/projetos/sdc_index.php (last visited 6 Feb. 2009).

[92] *See* ANDREA BARANZINI AND PHILIPPE THALMANN, VOLUNTARY APPROACHES IN CLIMATE POLICY 5 (Edward Elgar 2004) (2004) (differentiating voluntary self-regulating approaches as "abatement efforts

range from afforestation/reforestation like the abovementioned AES project in Guatemala, to conservation efforts like the aforementioned one referred to as taking place in the Atlantic forest.[93]

The lack of strict rules allowing for different modalities of project-based forestry activities is as promising as the criticisms over such initiatives. Under this unregulated environment, the voluntary market "suffers from fragmentation and a lack of widely available impartial information"[94], which transforms it into a large retail market, "composed of deals that are negotiated on a case-by-case basis, and that many of these deals neither require the carbon credits to undergo a uniform certification or verification process nor register them with any central body."[95] That translates into the voluntary market's inability to provide a safe,[96] uniform and transparent environment.[97]

On the flip side, the lack of a strict mandatory regime lowers a project's costs of implementation and lessens transaction costs in comparison with regulatory markets.[98] Due to its flexibility, voluntary markets provide a fertile environment for innovation, allowing not only private and public organizations to trade carbon credits, but also individuals. That has an enormous educational potential, especially when taken into consideration that individual behavior enjoys a great share of the overall greenhouses emissions.[99]

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initiated by firms without substantial counterpart by the regulator" from those public voluntary programmes as "pachages of required efforts and compensations that firms can choose to accept or not.").

[93] *See* Marisa Meizlish and David Brand, *Developing Forestry Carbon Projects for the Voluntary Carbon Market: A Practical Analysis, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 311, 313 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (describing the different types of project-activities under voluntary carbon forest markets, including afforestation, reforestation, conservation and avoided deforestation).

[94] RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12 (Earthscan 2007) (2007).

[95] RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12 (Earthscan 2007) (2007).

[96] *See* RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12 (Earthscan 2007) (2007) ("Many buyers also say they are wary of the voluntary carbon market since transactions often carry real risks of non-delivery. Some companies buying carbon credits also fear that they will be criticized by NGOs if the carbon they are buying isn't seen to meet the highest possible standards.").

[97] RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12 (Earthscan 2007) (2007).

[98] RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12-13 (Earthscan 2007) (2007).

[99] *See* RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 13 (Earthscan 2007) (2007) ("Having weighed pros and cons, many non-profit organizations are supportive of the voluntary

Additionally, innovation in the voluntary market attracted NGOs' participation to enhance carbon storage and sequestration beyond climate change mitigation. Through the voluntary market, NGOs are developing sustainable development standards to include in forest conservation and regeneration projects additional ecosystem services ignored by the climate change regulatory market.[100] Unlike the international climate change legal framework, other ecosystem services provided by forests are dealt in the international level mainly by international cooperation resembling a domestic command-and-control regime.[101] That is the case, for instance, of the other "Rio Conventions": the United Nations Convention on Biological Diversity ("CBD") and the United Nations Convention to Combat Desertification ("UNCCD"). The general idea is that, because they do not rely on market-based incentives, their ability to maximize the means through which their provisions are enforced and complied with is limited.[102]

In light of the still limited size of voluntary markets to the point experts predict a twofold increase is not going to impact the problem of climate change, they can serve a

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carbon market because it provides individuals – not just corporations and large organizations – with a means of participating in the fight against climate change in a way that the compliance markets do not. And since individuals account for most of the GHG emissions currently being put into the atmosphere (more than 50 per cent by some counts; Biello, 2006), some environmentalists view the voluntary carbon market as an important tool for educating the public about climate change and their potential role in addressing the problem.").

[100] *See* Katherine Hamilton et al., *Carving a Niche for Forests in the Voluntary Carbon Markets*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 292, 300-305 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (listing different not-for-profit initiatives on an attempt to create a set of standards in the voluntary market that reaches beyond merely climate change mitigation).

[101] *See generally* Kenneth Hanf, *The Domestic Basis of International Environmental Agreements*, *in* INTERNATIONAL ENVIRONMENTAL AGREEMENTS AND DOMESTIC POLITICS 1, 5 (Arild Underdal and Kenneth Hanf eds., 2000) ("Analysts of international regimes as a vehicle for international cooperation recognize that the international community is not confronted with the choice between anarchic, competitive international politics and hierarchically-ordered international policy making. A further, and increasingly prominent, alternative is some form of international collective self-regulation, i.e. the voluntary participation of states and other international actors in collective action to achieve joint gains or to avoid joint losses. International regimes are one manifestation of these efforts at collective self-regulation by states. Like domestic society, international society in many areas is characterised by non-hierarchical politics through which joint regulatory actions can be taken to deal with common problems.").

[102] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 25 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("At the international level, many environmental treaties, such as the UN Convention on Biological Diversity and the UN Convention to Combat Desertification, are in essence command-and-control regulatory regimes. And although they represent important global efforts to protect natural resources, their ability to do so is often limited by their voluntary nature (no enforcement of compliance), their lack of binding obligations (with the exception of the Convention on International Trade in Endangered Species, or CITES), and the absence of sustainable funding mechanism.").

rapid and short-term solution for other ecosystem services.[103] Although also object of international preoccupation, markets valuing biodiversity, aesthetic attributes, community-based educational opportunities, watershed protection, rainfall patterns, among others, are mainly of local and regional concern because these are the levels upon where the impacts of losing ecosystem services are most severely felt.[104] Following this tendency, voluntary forest initiatives in the Atlantic Rainforest are increasing.

To this end, three major initiatives taking place on the Atlantic Rainforest biome are note worthy: 1) a 100 million dollars joint project among the HSBC, Climate Group, Earthwatch Institute, Smithsonian Institute of Tropical Research and Worldwide Fund for Nature (WWF). The project's aim is fourfold: watershed protection, mitigation of the impacts of CO_2 concentration in large metropolitan areas, biodiversity and tropical forest research and individual engagement on raising environmental awareness;[105] and 2) a project developed by Society for Wildlife Research and Environmental Education ("SPVS") – an Atlantic Rainforest based NGO – in partnership with The Nature Conservancy, American Electric Power, Chevron and General Motors aimed at promoting conservation and natural regeneration in an area within the Atlantic forest of approximately 19,000 hectares.[106] A third voluntary initiative worthy of noticing is underway under the auspices of The Climate, Community & Biodiversity Alliance ("CCB"), but has not yet been implemented on the Atlantic Rainforest as per the writing of this study. According to the project's design document, the proposed activity "constitutes the first stage of an overarching reforestation scheme aiming at the

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[103] *See* RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12 (Earthscan 2007) (2007) (referring to a general feeling that the voluntary market still needs to increase in quantity and volume to actually impact the problem of global climate change).

[104] *See* Manuel Estrada Porrua and Andrea García-Guerrero, *A Latin American Perspective on Land Use, Land-Use Change, and Forestry Negotiations under the United Nations Framework Convention on Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 209, 220 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The role of forests in fostering development is particularly relevant at the local level, because some of the poorest people in Latin America – almost a third of them indigenous people – live in rural areas and depend to large extent on the resources provided by forests for their survival (including the opportunity of using them for other land uses as short-term solutions to cover their most urgent needs).").

[105] *See* Mater Natura e Instituto Earthwatch Firmaram Parceria para Desenvolver Programa 'HSBC Climate Partners' [Mater Natura and Earthwatch Institute Signed a Partnership to Develop 'HSBC Climate Partners' Program], *available at* http://www.rma.org.br/v3/action/news/detail.php?id=1638&style=news.

[106] *See* Projetos Seqüestro de Carbono – Projetos de Ação Contra o Aquecimento Global [Carbon Sequestration Projects – Action Projects Against Global Warming], *available at* http://www.spvs.org.br/projetos/sdc_index.php (last visited 6 Feb. 2009).

establishment of a corridor that will join two significan protected fragments of Atlantic Forest: the *Pau Brasil* National Park and the *Monte Pascoal* National Park."[107] All of these three voluntary initiatives are good examples of how the voluntary market can assist on maximizing the command-and-control regime in place.

Although facing rapid expansion, the voluntary market is still far from reaching the magnitude of the regulatory market.[108] In the forest sector though more projects take place in the voluntary market, but in contrast, credits generated in the regulatory market enjoy much higher market values.[109] Therefore, understanding how the international community replicated market-based policy instruments - that were restricted to some few United States' initiatives[110] - assists on the analysis of maximizing the implementation of the available regulatory market (the CDM of the Kyoto Protocol) to the Atlantic Rainforest biome. Prior to that, a brief panorama of existing regulatory market-based instruments serves as an useful introduction to the historical evolution of how forest and forestry practices made their way into the climate change legal regime and, once causation was established between forest practices and climate change, how policy instruments were shaped to promote sustainable forestry activities.

ii. Regulatory Carbon Markets

Besides voluntary markets, the only regulatory market available from which the Atlantic Rainforest can currently benefit from is the Clean Development Mechanism

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[107] The Climate, Community & Biodiversity Alliance ("CCB"), *The Monte Pascoal – Pau Brasil Ecological Corridor: Carbon, Community and Biodiversity Initiative – Monte Pascoal Farm – CPA#1*, 7, *available at* http://www.climate-standards.org/projects/files/cpa_dd_caraiva.pdf (last visited 31 Mar., 2009).

[108] *See* RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12-13 (Earthscan 2007) (2007) ("Although nobody has exact numbers on the size of the voluntary carbon market, most think it has grown rapidly in the last two years.").

[109] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 25 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Forest carbon projects account for a very small share, in both volume and value, of all emission reduction projects in the regulatory and voluntary carbon markets. The voluntary markets see a larger number of forest carbon projects . . . . the regulatory carbon markets are orders of magnitude larger than the voluntary markets.").

[110] *See* RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 12-13 (Earthscan 2007) (2007) ("Ever since the US established the first large-scale environmental market (to regulate emissions of gases that lead to acid rain), we have seen environmental markets emerging to trade in everything from wetlands to woodpeckers.").

("CDM") of the Kyoto Protocol.[111] Under the rules of this regulatory policy incentive, the only forestry activities allowed are afforestation/reforestation projects.[112] A detailed analysis of how the CDM forestry market operates, how it evolved since its conception in 1997 and future perspectives are further explored in Chapter 4. For what is worthy in this section, the 1997 Kyoto Protocol launched a worldwide carbon market inspirational for other regional and local regulatory initiatives.[113]

Albeit limited in scope, credits generated from the CDM carbon market are priced higher than those from the voluntary market.[114] Because the Kyoto Protocol's aim is to facilitate accomplishment of the UNFCCC's main objective, policy market instruments therein are not designed to value ecosystem services other than mitigating global climate change in a way that respects a developing country's sustainable development agenda.[115] In a compilation prepared by Rosimeiry Portela et al., 2008, the table below identifies different regulatory and voluntary markets, eligible forestry activities under each of them and their potentials to incorporate additional ecosystem services:

Forestry Project Types and Allowances in Regulatory and Voluntary Markets

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[111] *See generally* Peter Duncanson Cameron, *The Kyoto Process: Past, Present and Future*, *in* KYOTO: FROM PRINCIPLES TO PRACTICE 3, 11 (Peter D. Cameron and Donald Zillman eds., 2001) (describing the Clean Development Mechanism as "a new mechanism was set out in Article 12 to assist Parties not included in Annex I to achieve sustainable development and attain the ultimate objective of the Convention. Under the CDM the Annex I countries receive GHG credits or Certified Emissions Reductions (CERs) by sponsoring actual GHG offset projects or other actual technology transfer in a developing country.").

[112] Conference of the Parties to the United Nations Framework Convention on Climate Change, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II)*, Decision 17/CP.7, ¶ 7(a), U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter *COP-7 Report – Part Two (Volume II)*].

[113] *See* Farhana Yamin, *Introduction*, *in* CLIMATE CHANGE AND CARBON MARKETS xxix, xxx (Farhana Yamin ed., 2005) (noting that "domestic trading and offset schemes are also being devised in other parts of the world, including the US and Australia, that are Kyoto consistent and in many cases actually anticipate future linkages with the Kyoto mechanisms.").

[114] *See* The World Bank, *State and Trends of the Carbon Market 2008*, Exe. Sum., Table 1: Carbon Market at a Glance, Volumes & Values in 2006-07, *available at* http://siteresources.worldbank.org/NEWS/Resources/State&Trendsformatted06May10pm.pdf (comparing the volumes and values of different carbon markets including transactions under the CDM and the voluntary markets).

[115] *See* Farhana Yamin, *The International Rules on the Kyoto Mechanisms*, *in* CLIMATE CHANGE AND CARBON MARKETS 1, 30 (Farhana Yamin ed., 2005) ("[o]ne strategic rationale for the CDM's inclusion in the Protocol was to provide a quantified means for non-Annex I Parties to contribute to mitigation commitments and to get a better understanding of trading mechanisms, but without such Parties having to take on legally binding mitigation targets. Participation by developing countries in the CDM is thus part of their broader efforts to contribute to climate change mitigation in a manner which provides for 'learning by doing' while respecting their sustainable development priorities.").

Market	Eligible forestry options	Potential for incorporation of other forest benefits
Regulatory		
Kyoto Protocol CDM	Afforestation and reforestation	Low-medium
EU Emissions Trading Scheme	All forestry excluded until at least 2008	Low
Emerging U.S. regulatory markets (RGGI, Calif., federal)	U.S.-based forest conservation and restoration	Medium
New South Wales Abatement Scheme, Australia	Australian forest restoration only	Medium
Voluntary		
Voluntary retail carbon market	Tropical forest conservation and restoration	High
Chicago Climate Exchange	Tropical forest restoration and forest conservation	High

Source: Rosimeiry Portela et al.[116]

In comparison with renewable energy, energy efficiency and fuel switching projects under the CDM policy market incentives, forest projects remain minor in both volume and credits generated.[117] However, that was not always the case. Prior to the 1997 Kyoto Protocol, the period following the 1992 UNFCCC was marked by a learning phase in which forestry projects, including conservation, were promising.[118]

[116] Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 21 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008).

[117] *See* UNEP Risoe Centre on Energy, Climate and Sustainable Development ("UNEP Risoe"), *The 2009 January !st Updates of the UNEP Risoe CDM and JI Pipelines*, *available at* www.CDMPipeline.org/Publications/CDMPipeline.xls (last visited 31 Mar., 2009) (providing an updated list with different CDM project-activities by types).

[118] *See* Fifteen Session of the Subsidiary Body for Scientific and Technological Advice, Marrakesh, Morocco, Oct. 29-Nov. 9, 2001, *Activities Implemented Jointly Under the Pilot Phase: Fifth Synthesis Report on Activities Implemented Jointly Under the Pilot Phase – Note by the Secretariat*, Annex fig.4, U.N. DOC FCCC/SBSTA/2001/7 (Sept. 12, 2001) [hereinafter *2001 SBSTA Report*] (revealing significant

But because forestry activities for the first commitment period (2008-20012) are restricted to afforestation/reforestation projects with strict procedural rules typical to a regulated baseline-credit program, they ended up underutilized.[119]

On the flip side, different stakeholders from the industry, government and non-governmental sectors, for various reasons, started lobbying for the inclusion in the post-2012 commitment period, conservation forest activities beyond those currently permitted. Industry view carbon forest markets as the most cost-effective policy instrument in assisting with emissions reduction regulations.[120] Some countries with large forest stocks – excluding Brazil - envision forest conservation as an opportunity to attracting foreign investments, building and strengthening technical capacity.[121] NGOs seek to expand the scope of a worldwide market-based policy instrument designed for climate change mitigation to promote additional ecosystem services likewise is currently happening in the voluntary market.[122]

This international lobbying around expanding the scope of forest activities under the Kyoto regulated market is named "reducing emissions from deforestation and degradation" ("REDD").[123] Under REDD different approaches are being debated on the

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numbers of forest preservation, reforestation or restoration and afforestation project-activities under the Activities Implemented Jointly Pilot Phase).

[119] *See* Johannes Ebeling, *Risks and Criticisms of Forestry-Based Climate Change Mitigation and Carbon Trading*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 43, 44 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (noting that "[p]artly as a result of complicated requirements and the delayed agreement on these requirements, only one forestry project had gained the approval of the CDM Executive Board as of February 2008, versus more than 900 registered projects overall.").

[120] *See* N. Stern et al., *Stern Review on the Economics of Climate Change*, 217 (2006), *available at* http://www.hm-treasury.gov.uk/stern_review_report.htm (demonstrating that the forestry sector represents the most cost-effective climate change mitigation option).

[121] *See Summary of the Thirteenth Conference of Parties to the UN Framework Convention on Climate Change and Third Meeting of Parties to the Kyoto Protocol*, EARTH NEGOTIATIONS BULL., Dec. 18, 2007, at 7, *available at* http://www.iisd.ca/download/pdf/enb12354e.pdf (regarding the issue of reducing emissions from deforestation in developing countries, "[d]iscussion centered mainly on the inclusion of conservation and enhancement of forest carbon stocks, as proposed by India, Bhutan and others and opposed by Brazil, the EU and others;").

[122] *See* DANIEL NEPSTAD, THE WOODS HOLE RESEARCH CENTER: REED – REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION – THE COSTS AND BENEFITS OF REDUCING CARBON EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN THE BRAZILIAN AMAZON (2007), *available at* http://www.whrc.org/resources/published_literature/pdf/WHRC_REDD_Amazon.pdf, (last visited Jun. 10, 2008) (a report from different not-for-profit organizations supporting forestry activities aimed at reducing emissions from deforestation and forest degradation).

[123] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 181 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The discussions were initiated by a proposal put forward in 2005, at the eleventh session of the Conference of the Parties (COP) to the UNFCCC, by the governments of Papua New Guinea and Costa Rica. The formation of the Colation for Rainforest Nations created additional momentum to address the issue, and it

road to the next Kyoto Protocol's meeting of the parties in the end of 2009, in Copenhagen. From financial incentives to countries reducing deforestation rates below a predefined baseline to a proposal of a cap-and-trade forestry program distributing deforestation allowances among regulated countries are all among the proposed approaches focusing on promoting conservation and preservation activities under the climate change regime.[124] But considering the Atlantic Rainforest's reality of only 7.26% primary forested areas left and considering this left remaining area is protected by a command-and-control system combined with different economic policy instruments (i.e. taxes and subsidies, tradable permits and market enhancement), the overall data suggests that regeneration and afforestation/reforestation types of projects/policy approaches are better suitable – at least in the short term - to benefiting the Atlantic Rainforest biome.[125]

Thus, prior to exploring in deeper details the history underlying conflicting interests over the introduction of forestry activities into the climate change regime and how the scope of projects under the market-based Kyoto policy instrument was narrowed throughout the negotiation process, the following section examines the Atlantic Rainforest biome's main historical, ecological and socio-economic features. The next section also includes the command-and-control regime currently in place and available economic policy incentives. In order for a more accurate assessment of whether the dominant regulatory market-based policy instrument - the CDM of the Kyoto Protocol - or voluntary markets can maximize current conservation and regeneration laws and regulations, understanding the main historical, ecological and socio-economic features of the region under examination, the Brazilian Atlantic Rainforest, is essential.

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has since become a highly visible topic discussed at all levels, from the UN Security Council to 'talk back' radio.").

[124] *See generally* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 182-184 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (discussing the different policy approaches for REDD activities for a post-2012 climate deal under the UNFCCC and Kyoto Protocol).

[125] The AES-Tiete Afforestation/Reforestation CDM project-activity taking place on the Atlantic Rainforest biome is an example of how the Kyoto regulatory afforestation/reforestation market can be an effective auxiliary policy instrument aimed at enhancing the provisions of the existing protective command-and-control regime currently in place. *See* Clean Development Mechanism Project Design Document for Reforestation and Afforestation Project-Activities, *AES-Tiete Afforestation/Reforestation Project Activity Around the Borders of Hydroelectric Plant Reservoirs, ARNM0034, 2007*, at 3, U.N. DOC FCCC/SB/2000/XX, Version 3, (Mar. 5, 2007).

d. The Brazilian Atlantic Rainforest Biome

Brazil is the largest and most populous country in South America, and fifth largest in the world in both area and population. Brazil is bigger than the continental United States. It has a population of approximately 190 million inhabitants[126], and a total area of 3,287,597 square miles. According to the World Bank and the International Monetary Fund, Brazil's GDP of 1.6 trillion dollars is ranked 9th in the world. Brazil is also home to extensive agricultural land, rain forests and wetlands and one fourth of the world's surface and underground freshwaters.[127]

Due to the country's continental size, Brazil is divided into different biomes according to the ecological attributes and similarities of each of its diverse regions. A "biome" is defined as a combine contiguous group of similar fauna and flora, identifiable in regional scale, with similar climatic conditions and shared historical changes, resulting in a unique biological diversity.[128] Being able to differentiate the notion of "biome" from that of "forest" - for instance - is crucial to understanding the challenges and opportunities of forest carbon markets within the Atlantic Rainforest region. Therefore, a biome can be home to different kinds of ecological formations, including forests, grasslands or other types of vegetation that are grouped into a "biome" due to similar and linked biological features.

The purpose of classifying similar regions into "biomes" is to facilitate the study and planning so as to maximize conservation, preservation and sustainable development policies. In that sense, the Brazilian official map of biomes (figure 1) identifies six different environmentally important regions. The Atlantic Rainforest is one of them. This forest is a biodiversity mosaic, "composed of numerous vegetation types distributed along 27 degrees of south latitude, with great variations in elevation."[129] The other listed biomes are the Amazon Rainforest, the Savanna ("Cerrado"), the Caatinga, the Pantanal and the Pampa.

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[126] THE BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS [IBGE] *available at* http://www.ibge.gov.br/english/, (last visited Sep. 11th, 2008).
[127] THE BRAZILIAN MINISTRY OF MINING AND ENERGY *available at* http://www.mme.gov.br/site/menu/select_main_menu_item.do?channelId=9810, (last visited Sep. 11th, 2006).
[128] THE BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS [IBGE] *available at* *http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=169&id_pagina=1*.
[129] Luiz Paulo Pinto and Maria Cecília Wey de Brito, *Dynamics of Biodiversity Loss in the Brazilian Atlantic Forest: An Introduction*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 27, 27 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003).

Starting with the Amazon biome, considering the region is home to the largest tropical rainforest in the world, and currently faces great tension between economic development and environmental preservation, the region is the center of domestic and international attention. The biome is the largest in the country, occupying approximately 50% of the entire Brazilian territory (Table 1). Worth noticing, though, that while the majority of the biome is dense forest, a smaller portion is composed of other types of vegetation, like grasslands and savannahs, for example.[130] Despite not being entirely composed by forest formation, those other kinds of vegetation are considered part of the biome because of their ecological link to the overall ecosystem, illustrating the difference between a biome and one specific type of vegetation. But the importance of the Amazonian biome spans over its ecological formation: the country's biggest river basin is found in the Amazon, which makes it the region with the largest concentration of fresh water resources. Yet, the Amazon Rainforest is of crucial importance to regulate climatic patterns in the South and Southeast regions of Brazil, being directly responsible for rainfall rates, crucial to the last remaining preserved areas of the Atlantic Rainforest.[131]

According to the FAO, the "Cerrado" is the second largest ecological region in Brazil, situated in Central Brazil and comprising an area of approximately 25% of the country. Vegetation found on the biome presents savannahs and forests composed of continuous herbaceous stratum joined "to an arboreal stratum with variable density of woody species."[132] The "Cerrado" is where most of the current agribusiness activities in Brazil take place and, therefore, is the last development frontier before the Amazon biome to the north.

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[130] *See generally* Food and Agriculture Org. of the U.N. [FAO], *Brazil: Country Report To The FAO International Technical Conference on Plant Genetic Resources*, 9 (1996), *available at* http://www.fao.org/ag/AGP/AGPS/pgrfa/pdf/brazil.pdf [hereinafter *Brazil Country Report to the FAO 1996*] ("The Brazilian Amazon Forest [tropical rainforest] covers a surface of approximately 3.5 million square kilometers and corresponds to nearly 40% of all national territory. Of this total, a 2 million km^2 are made up of 'dense ombrofila' forest [57%], and 1.1 million km^2 are composed of open 'ombrofila' forest [31%]. The remaining land, 400 thousand km^2 [12%] is covered with other kinds of vegetation, including ecotones, stationary forests, natural fields, and grasslands and savannahs".).

[131] *See* Charles R. Clement & Niro Higuchi, *A Floresta Amazônica e o Futuro do Brasil* [The Amazon Forest and the Future of Brazil], Vol. 58, n. 3 CIÊNCIA E CULTURA [SCIENCE AND CULTURE] 44, 45 (Jul/Sept, 2006), published by The Brazilian Society for the Development of Science, *available at* http://cienciaecultura.bvs.br/scielo.php?pid=S0009-67252006000300018&script=sci_arttext&tlng (stating that between 25 and 50%.of the rainfall in the Southeast part of Brazil originates in the Amazon biome).

[132] Food and Agriculture Org. of the U.N. [FAO], *Brazil: Country Report to the FAO International Technical Conference on Plant Genetic Resources*, 9-10 (1996), *available at* http://www.fao.org/ag/AGP/AGPS/pgrfa/pdf/brazil.pdf [hereinafter *Brazil Country Report to the FAO 1996*].

The Caatinga biome in the Northeast part of Brazil is the driest region of the country. This biome resembles a desert landscape, "characterized by the xerofitic vegetation typical of a semi-arid climate."[133] The region is situated between the Northeastern part of the Atlantic Rainforest and the "Cerrado" biome, and presents the lowest human development indexes in the country.

Westward of the "Cerrado", is one of the World's largest wetlands, classified as the biome known as the Pantanal. This large area of floodplains is described by the FAO as "a geologically lowered area filled with sediments which have settled in the basin of the Paraguay River(...)."[134] Although most of the Pantanal lies within Brazil, smaller parts of the region stretch out into Bolivia and Paraguay as well.[135] The Pantanal, just like parts of the remaining Atlantic Rainforest - for their environmental importance, was also designated by the United Nations Educational Scientific and Cultural Organizations ("UNESCO") as a biosphere reserve and was inscribed in the UNESCO World Heritage List in 2000.[136]

In the Southern most part of Brazil, where the country borders Argentina and Uruguay, lies the Pampa biome. The region is restricted to the Rio Grande do Sul state. It comprises 63% of that state´s territory and it is one of the most biodiverse campestral types of ecosystems in the world. Three thousand species of plants, out of which four

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[133] Food and Agriculture Org. of the U.N. [FAO], *Brazil: Country Report To The FAO International Technical Conference on Plant Genetic Resources*, 11 (1996), *available at* http://www.fao.org/ag/AGP/AGPS/pgrfa/pdf/brazil.pdf [hereinafter *Brazil Country Report to the FAO 1996*].

[134] *See generally* Food and Agriculture Org. of the U.N. [FAO], *Brazil: Country Report To The FAO International Technical Conference on Plant Genetic Resources*, 13-14 (1996), *available at* http://www.fao.org/ag/AGP/AGPS/pgrfa/pdf/brazil.pdf [hereinafter *Brazil Country Report to the FAO 1996*] ("Of these lands [within the Pantanal region], approximately 140.000 km^2 are on Brazilian territory, covering parts of the States of Mato Grosso and Mato Grosso do Sul. The water cycle conditions life in this ecosystem. The floods in this region can be caused by pluvial waters, fluvial waters due to overflowing of the rivers, and by an elevation in the water table. During the flooding process, many rivers flow along a growing series of branching beds. False rivers also arise, without their own basin, and some rivers may lose their identity. This complex system of drainage, branched and undefined, by its dynamic nature of seasonal and multi-annual floods, decisively influences the biodiversity and productivity of the ecosystem, demanding systems of multiple sustainable use of its natural resources.").

[135] *See* Mario Dantas, Pantanal: Use and Conservation 2 (Nov. 27, 2000) (paper presented at the III Simpósio sobre Recursos Naturais e Sócio-econômicos do Pantanal – Os Desafios do Novo Milênio [Third Symposium on the Natural and Socio-economic Resources of the Pantanal – The Challenges of the New Millenium], on file with the author).

[136] *See* U.N. Educational, Scientific and Cultural Org. [UNESCO], *World Heritage List, available at* http://whc.unesco.org/en/list/999 ("The Pantanal Conservation Complex consists of a cluster of four protected areas with a total area of 187,818 ha. Located in western central Brazil at the south-west corner of the State of Mato Grosso, the site represents 1.3% of Brazil's Pantanal region, one of the world's largest freshwater wetland ecosystems. The headwaters of the region's two major river systems, the Cuiabá and the Paraguay rivers, are located here, and the abundance and diversity of its vegetation and animal life are spectacular.").

hundred are different types of grasses used for cattle ranching, can be found in the Pampa. The region is also home for over ninety species of mammals.[137]

In short, the above description of the Atlantic Rainforest neighboring biomes provides useful guidance and comparison standards to situate the Atlantic forest region, one of the most degraded ecosystems in the world.[138] The exact definition of the Atlantic forest was not clear until a meeting of over forty experts agreed that this biome "should encompass the coastal rainforests; the mixed forests of Brazilian pine, also known as Paraná pine or araucaria (*Araucaria angustifolia*); and forests dominated by the laurel family (Lauraceae) in the south, the deciduous and demideciduous forests of the interior, and the ecosystems associated with these, including mangroves, *restingas* (coastal, sandy-soil forest and scrub), high-altitude grasslands, pockets of pastures and grasslands, and the montane *brejos* and *chás*."[139] Though not as well known as its Amazon cousin, the destruction of a forest that combines tropical and subtropical climate, the size of the Atlantic Rainforest is, nevertheless, without parallel.[140] The magnitude of more than five centuries of degrading economic activities is even greater considering the forest's ecological attributes,[141] explored in deeper details below.

The Brazilian official map of biomes puts into perspective the country's division into the above described ecological regions (figure 1), while also highlighting the Atlantic Rainforest biome along the east coast of Brazil, which was recognized by the

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[137] *See* Camila Vassalo, Mapeamento Mostra que Bioma Pampa Conserva 41% da Cobertura Vegetal Nativa [Mapping Shows that Pampa Biome Conserves 41% of its Native Vegetation], *available at* http://www.agenciabrasil.gov.br/noticias/2007/12/21/materia.2007-12-21.0990732054/view (last visited Jun. 2, 2008).

[138] *See* Carlos Galindo-Leal and Ibsen de Gusmão Câmara, *Atlantic Forest Hotspot Status: An Overview*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 3, 3 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("The Atlantic Forest hotspot is arguably the most devastated and most highly threatened ecosystem on the planet. It is a hotspot where the pace of change is among the fastest and, as a consequence, where the need for conservation action is most compelling. Although the Atlantic Forest is thought to have originally ranged from 1 to 1.5 million km^2, only 7-8 percent of the original forest remains.").

[139] Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 31 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003)

[140] *See* Carlos Galindo-Leal and Ibsen de Gusmão Câmara, *Atlantic Forest Hotspot Status: An Overview*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 3, 4 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Since the colonization by the Portuguese and Spanish, the Atlantic Forest has had a long history of intensive land use for commodity exports, including cycles of exploitation of brazilwood, sugarcane, coffee, cocoa, and cattle grazing, all of which have utterly transformed the landscape. More recent drivers of biodiversity loss include intensive forms of government-subsidized soy agriculture and expanding forest plantations of pine and eucalyptus.").

[141] *See* Carlos Galindo-Leal and Ibsen de Gusmão Câmara, *Atlantic Forest Hotspot Status: An Overview*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 3, 3 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("The Atlantic Forest is one of the world's 25 recognized biodiversity hotspots, areas where the original vegetative cover has been reduced by at least 70 percent but that together house more than 60 percent of all terrestrial species on the planet.").

National Environmental Council ("CONAMA") in 1992 as the "Atlantic Rainforest Domain":[142]

Figure 1:

Source: The Brazilian Institute of Geography and Statistics [IBGE]

To illustrate the magnitude of the Atlantic Rainforest region, the entire biome encompasses 13,04% of the total area of the country. An area that once was fully covered with and composed by different similar groups of rich and biodiverse ecosystems, including large areas of rainforest. A description of the Atlantic Forest is provided below:

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[142] *See* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest, in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 32 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("After subsequent refinement, this definition was approved in 1992 by the National Council on the Environment (CONAMA), and the area was given the name "Atlantic Forest Domain." The boundaries conformed to the Map of Brazilian Vegetation published in 1988 (and revised in 1993) by the Instituto Brasileiro de Geografia e Estatística (IBGE), a federal government agency.").

"The Atlantic Forest once covered an area of nearly 1,400,000 km^2 in Brazil alone. It covered a broad latitudinal strip along the Brazilian coast, from Rio Grande do Norte to Rio Grande do Sul. More than 75 percent was forest, with enclaves of scrub, montane, ruperstrine (rochky) grasslands, and open country-side with low-growing vegetation (*caatinga* [open forest ecosystem consisting of thorny shrubs and stunted trees], dry xeromorphic, scrub and deciduous forest and *cerrado* [woodland-savannah ecosystems that support a unique array of drought- and fire-adapted plan species], bush savanna typical of the central plateau of Brazil), as well as coastal mangrove swamps and forests and *restingas* (coastal scrub and forest on sandy soils)."[143]

Within Brazil, in comparison with the other listed Brazilian biomes, the Atlantic Rainforest is the third largest, falling behind only the Amazon and "Cerrado". The total area of the forest within Brazil, currently confirmed and provided the Brazilian Institute of Geography and Statistics, is of approximately 1.110.182 km^2 (table below). That is equivalent to over twice the size of France, for instance.[144] Out of the total area encompassed by the Atlantic Rainforest biome, though, only 7.26%, or 80.600 km^2, remain preserved.[145] A complete list with the total areas and the percentage each biome occupies in the country appears in the table below:

Table 1:

BIOMAS CONTINENTAIS BRASILEIROS	ÁREA APROXIMADA (KM2)	ÁREA / TOTAL BRASIL
Bioma AMAZONIA	4.196.943	49,29%
Bioma CERRADO	2.036.448	23,92%
Bioma MATA ATLANTICA	1.110.182	13,04%
Bioma CAATINGA	844.453	9,92%
Bioma PAMPA	176.496	2,07%
Bioma PANTANAL	150.355	1,76%
Area Total BRASIL	8.514.877	

[143] José Maria Cardoso da Silva and Carlos Henrique M. Casteleti, *Status of the Biodiversity of the Atlantic Forest of Brazil, in* THE ATLANTIC FOREST OF SOUTH AMERICA 43, 44 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003)

[144] *See* EUROPEAN UNION [EUROPA], http://europa.eu/abc/european_countries/eu_members/france/index_en.htm (last visited Jun. 3, 2008) (providing for the total area of France 550.000 km^2).

[145] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

Source: The Brazilian Institute of Geography and Statistics [IBGE]

In one of the most comprehensive studies ever published in English about the history of the relationship between human settlement and the Brazilian Atlantic Rainforest, Waren Dean described this biome, highlighting its connection with the Amazon Forest and its complex composition of different forest types:

> "On the eastern margin of South America there once stretched an immense forest, or more accurately, a complex of forest types, generally broadleaved, rain loving, and tropical to subtropical, stretching from about 8° to about 28° south latitude and extending inland from the coast about 100 kilometers in the north, widening to more than 500 kilometers in the south. Altogether the forest covered about a million square kilometers. This complex has been referred to as the Brazilian Atlantic Forest, related to the much larger Amazon Forest but distinct from it. Together, these two great forests formed a life zone distinct from and richer in species than those of the other tropics of our globe, situated in Africa and Southeast Asia. The Atlantic Forest was itself remarkably diverse, considering its relatively modest size. And it contained a remarkable number of endemic species – that is, life forms peculiar to it – even though it shared the same continental landmass with the Amazon Forest and was for long geological periods in partial contact with it."[146]

This nostalgic, yet precise description of the Atlantic Rainforest biome provides a glimpse of what once was this diverse group of similar ecosystems. However, throughout the years, since the first wave of Portuguese settlers back in the sixteenth century, the Atlantic Rainforest was heavily disturbed for the aggregated value of its natural resources in Europe.[147] More recently, unsustainable land-use and development patterns added on to the critical situation currently facing the few preserved areas of

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[146] WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 6 (U. Calif. Press 1995) (1995).

[147] *See* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 36 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("According to historical accounts, the deliberate destruction of the forest got under way when the colonists began to clear land for settlement, planting, and better defense against indigenous attacks. They burned extensive areas for these purposes and also later during military skirmishes against other Europeans. Wood was steadily consumed for all purposes; indeed, for centuries it was the only available form of fuel.").

native Atlantic forest.[148] Altogether, historical factors and social-economical indicators of the region are the starting point of the following sections providing the basis for a detailed analysis of the challenges and obstacles facing conservation and preservation policies of existing forested areas and restoration practices of currently degraded lands.

i. The Region's Profile

During the constitutional reform in Brazil in 1988, the Atlantic Rainforest was included into the Constitution and received special protection as a result of lawmakers' recognition of its ecological, historical and cultural values. Out of the other five biomes, along with the Amazon Rainforest and the Pantanal,[149] the Atlantic forest was declared by article 225, paragraph 4 of the 1988 Brazilian Constitution as being part of the "national patrimony"[150], one that deserves special protection in its use and exploitation. By "national patrimony", this constitutional provision emphasized the importance of the Atlantic forest for the entire Brazilian society. Consequently, it authorized reasonable restrictions on property rights within the biome. This was significant considering over 70% of the region currently falls within private property domain.[151]

Nonetheless, the "national patrimony" designation did not represent regulatory or ordinary takings.[152] "National patrimony" is a Brazilian domestic version of the

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[148] *See* Luiz Paulo Pinto and Maria Cecília Wey de Brito, *Dynamics of Biodiversity Loss in the Brazilian Atlantic Forest: An Introduction, in* THE ATLANTIC FOREST OF SOUTH AMERICA 27, 28 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Threats to the biodiversity of the Atlantic Forest are exacerbated by the fact that the region is home to approximately 70 percent of Brazil's 169 million people. Most of this population lives in megacities such as São Paulo and Rio de Janeiro. Furthermore, about 80 percent of Brazil's gross domestic product is generated in the Atlantic Forest, and the region shelters Brazil's largest industrial and sivicultural centers.").

[149] *See* Colin Crawford & Guilherme Pignataro, *The Insistent (And Unrelenting) Challenges Of Protecting Biodiversity in Brazil: Finding "The Law That Sticks"*, 39 U. MIAMI INTER-AM. L. REV. 1, 9 (2007) ("The significance and variety of Brazilian ecosystems is such that a number of the most important biomes receive constitutional protection.").

[150] Paulo de Bessa Antunes, Direito Ambiental [Environmental Law] 335 (11th ed. 2008) (pointing out to the fact that 73% of the Atlantic Rainforest fall within private properties). *See also id.* at 500 (expressing the understanding that the term "national patrimony" in the constitution does not expropriate the property of those in the Altantic Rainforest region. The intention was to require from landowners within those designated biomes sustainable use of their property and resources so as to reinforce the constitutional right of an ecologically balanced environment for which the conservation of the Atlantic and Amazon Rainforests and the Pantanal are a crucial part of it).

[151] Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 225, §4 (1988). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (containing an English version of the 1988 Brazilian Constitution) (last visited Jun. 2, 2008).

[152] The Brazilian Supreme Court ("Supremo Tribunal Federal") has interpreted art. 225, paragraph 4, and decided that the Atlantic Rainforest does not fall within public property, nor it is in trust with the Federal Government, in spite the constitutional reference that the forest is part of the national patrimony. In

notion embedded in the international principle of common concern of humankind. In other words, that means that a legal regime (either a domestic or the international one) recognizes and respects private rights (property rights in national regimes, sovereignty rights internationally), but due to the special features of the regulated good (the environment), it establishes a governing principle dictated by "public conscience and the fundamental values of humanity" (in the international context – or fundamental values of the Brazilian society within the national context), that will implicitly allow for reasonable regulated restrictions.[153]

The special constitutional recognition conferred upon the Atlantic Rainforest biome was reaffirmed by the UNESCO. One of the most preserved areas of the Atlantic forest, the so-called South-East Reserves, was designated an international biosphere reserve in 1992 and inscribed in the UNESCO World Heritage List in 1999.[154] From that moment onwards, and with the international community agreeing upon the 1992 Convention on Biological Diversity, the forest's ecological attributes became not only a common concern of the Brazilian inhabitants, but one of the humankind.[155]

Within this context of national and international recognition, this section highlights some of the Atlantic Rainforest's main features, including its ecological attributes, geographical and demographical information, colonial history, social, economic and political profiles. It describes the importance of this particular biome as a case study of forest restoration and preservation in light of the current available forest market mechanisms.

ii. The Atlantic Rainforest's Ecological Attributes

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practical terms, the constitutional inscription is limited to confer upon the Atlantic Rainforest special protection and care from the Brazilian society. *See* S.T.F.P-1, RE NO. 134.297-8, Relator: Min. Celso de Mello, 22.09.1995, (find at http://www.stf.gov.br/) (Brazil).

[153] The notion of the principle of common concern of humankind was shaped by Article 3 of the Draft Covenant on Environment and Development of the International Union for the Conservation of Nature (IUCN), *available at* http://www.iucn.org/themes/law/pdfdocuments/EPLP31EN_rev2.pdf, (last visited May 6, 2006) ("Common Concern of Humankind: The global environment is a common concern of humankind. Accordingly, all its elements and processes are governed by the principles of international law, the dictates of the public conscience and the fundamental values of humanity.").

[154] *See* U.N. Educational, Scientific and Cultural Org. [UNESCO], *World Heritage List, available at* . http://whc.unesco.org/en/list/893. ("The Atlantic Forests (Southeast) contain the best and the largest remaining examples of Atlantic forest in the southeast region of Brazil. The 25 protected areas that make up the site display the biological richness and evolutionary history of the few remaining areas of Atlantic forests of southeast Brazil. The area is exceptionally diverse with high numbers of rare and endemic species. With its "mountain to the sea" attitudinal gradient, its estuary, wild rivers, karst and numerous waterfalls, the site also has exceptional scenic values.").

[155] *See* United Nations Convention on Biological Diversity, pmbl., Jun. 5, 1992, 1760 U.N.T.S. 79, ("*Affirming* that the conservation of biological diversity is a common concern of humankind.")

The importance of the Atlantic Rainforest biome outweighs the fact it is home to the most industrialized and wealthy parts of the country.[156] Putting aside the region's social and economical indicators, the biodiversity rates of the Atlantic forest are extremely high. And that is due to a combination of ecological features, including the forest's latitudinal span, strong altitudinal gradients and extreme climate changes in the past.[157]

However, after over five hundred years of intense exploitation patterns since the arrival of the first Portuguese expedition fleet in April 21, 1500 and up until today, only 7.26% of the entire biome remains preserved.[158] Out of those few 7.26% left, official data reveals that approximately only 4% are native forest and the remaining 3.26% are restored forested areas[159]. For better or for worst, this data could indicate successfully restoration policies or, more likely - considering the information on recent decades - that restoration efforts are not keeping up with the deforestation rates.[160] Corroborating the

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[156] *See* Antonio Herman Benjamin, Cláudia Lima Marques & Catherine Thinker, *The Water Giant Awakes: An Overview of Water Law in Brazil*, 83 TEX. L. REV. 2185, 2187 (2005) (referring to the Southeast region, within the Atlantic Rainforest, as "[t]he economic heart of the country, this region brings together the states with the greatest population and industrial production."); *see also See* Luiz Paulo Pinto and Maria Cecília Wey de Brito, *Dynamics of Biodiversity Loss in the Brazilian Atlantic Forest: An Introduction*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 27, 28 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003).

[157] *See generally* José Maria Cardoso da Silva and Carlos Henrique M. Casteleti, *Status of the Biodiversity of the Atlantic Forest of Brazil*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 43, 44-45 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("The biota of the Atlantic Forest is extremely diverse (Conservation International do Brasil et al. 2000). Although our biological understading of extensive areas is still incomplete, the region is believed to harbor 1 to 8 percent of world's total biodiversity. Considerable environmental diversity within the Atlantic Forest biome may be the reason for the diversity of species and the high degree of endemism. Latitude is an important axis of variation: unlike most other tropical forests, the Atlantic Forest extends over 27 degrees. Latitude greatly affects the geographic distribution of lizards, for example, and only one species is found throughout the region (Vanzolini 1988). Altitude is also important: the Atlantic Forest covers terrain ranging from sea level to 2,700 m, with consequent altitudinal gradients of diversity (Holt 1928; Buzzetti 2000). Finally, there is also longitudinal variation: the forests of the interior differ significantly from those nearer to the coast (Rizzini 1997). These three factors together create a unique diversity of landscapes, and explain, at least in part, the extraordinary species diversity of the region.").

[158] *See* Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008) (estimating precisely the remaining forested areas in the Atlantic Rainforest biome in 7,26% of its original coverage).

[159] Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation) [EMBRAPA], *A Embrapa nos Biomas Brasileiros (Embrapa in the Brazilian Biomes)*, 11 (2007), *available at* http://www.embrapa.br/publicacoes/institucionais/laminas-biomas.pdf (last visited Jun. 9, 2008).

[160] *See* Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008), *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008) (stressing out that in spite of the reduction

challenges of restoration and preservation efforts,[161] botanical studies demonstrate that the forest's natural restoration capacity varies anything from twenty – in its primitive stage of recovery – to over one hundred years – in its more mature stage of recovery.[162]

Another special feature of this biome refers to its biodiversity numbers, both in fauna and flora. Even within the remaining 7.26% left of preserved forested areas, the biodiversity rates are among the highest in the world.[163] For example, in a comparison with the Amazon forest, the Atlantic Rainforest has proportionally more species of plants and animals.[164] It would fall outside the scope of this study to lay down these numbers, especially because they are not consensual,[165] and because many species have not yet been cataloged or known.[166]

The positive side of the described degradation trend though is that modern satellite imaging improved significantly over the past two decades[167] and, therefore, is

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in the deforestation rates verified in the period 2000-2005, when comparing them with previous versions of the monitoring reports [1985-90, 1990-95 and 1995-00], the deforestation rates are still high taking into consideration the entire monitoring period since its conception in 1985).

[161] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 15 (U. Calif. Press 1995) (1995) ("The complexity of this forest, then, considered as a single system, is extreme. It cannot be regarded as more resilient than simpler systems, however. Indeed, the opposite may be true: Its complexity may render it more vulnerable to trauma. The integrity of the system may prove extremely difficult to maintain or to reconstitute, in the event of external intervention.").

[162] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 14 (U. Calif. Press 1995) (1995) (detailing the timeframe of restoration processes in the Atlantic Forest based upon different disturbing causes).

[163] Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001*, 24-25 (2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/54.pdf (last visited Jun. 17, 2008) (providing the biodiversity numbers for the Atlantic Rainforest in both fauna and flora).

[164] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008), *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

[165] *See* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 35 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Published data on the number of species and the degree of endemism of the Atlantic Forest flora and fauna are variable.").

[166] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 5 (U. Calif. Press 1995) (1995) ("What is lost when tropical forest is destroyed is not only greater in variety, complexity, and originality than other ecosystems, it is incalculable. For although cataloguing of a tropical forest is well beyond our resources, now or in the imaginable future. The disappearance of a tropical forest is therefore a tragedy vast beyond human knowing or conceiving.").

[167] *See* Márcia Makiko Hirota, *Monitoring the Brazilian Atlantic Forest Cover*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 60, 60 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("In recent years the SOS Atlantic Forest Foundation (Fundação SOS Mata Atlântica) and the National Institute for Space Research (Instituto Nacional de Pesquisas Espaciais, or INPE) have enlisted satellite imaging, information technology, and remote sensing to prepare the Atlas of Remaining Forest Areas and Associated Ecosystems of the Atlantic Forest (Fundação SOS Mata Atlântica et al. 1990, 1998; Fundação SOS Mata Atlântica/INPE 1992, 2001; http.sosmatatlantica.org.br).").

being able to reproduce pictures of deforestation practices in the smallest parcels.[168] As a result, the data is being widely advertized and, consequently, known in Brazil and abroad.[169] Better and publicized data improves access to information, which, in turn, is crucial to qualifying public participation not only in the decision-making process, but also in monitoring environmental law compliance and enforcement.[170] It is also critical for monitoring, verification and accounting under any forest market mechanism.

To the extent protective legislation are being complied with or enforced, is decisive to investigating whether an economic or market incentive, such as the CDM of the Kyoto Protocol, can be an effective auxiliary conservation and regeneration policy instrument.[171] Compliance and enforcement with protective legislation is a requirement under the CDM rules for selecting a baseline scenario from which additionality is measured.[172] But that is examined in deeper details in Chapter 5 along with the degree of enforcement and compliance with the current protective domestic Atlantic forest legal framework.

iii. Geographical and Demographical Information

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[168] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 14 (2008), *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

[169] *See* Colin Crawford & Guilherme Pignataro, *The Insistent (And Unrelenting) Challenges Of Protecting Biodiversity in Brazil: Finding "The Law That Sticks"*, 39 U. MIAMI INTER-AM. L. REV. 1, 9 (2007) ("The Atlantic Rainforest has suffered so greatly as the result of 500 years of intense exploitation that it is often labeled 'the most threatened tropical forest in the world.' As a result, it is now a mere 7% of its original size.").

[170] *See* United Nations Economic Commission for Europe ("UNECE") Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, pmbl., June 25, 1998, 2161 U.N.T.S. 447 [hereinafter Aarhus Convention] ("Recognizing that, in the field of the environment, improved access to information and public participation in decision-making enhance the quality and implementation of decisions, contribute to public awareness of environmental issues, give the public the opportunity to express its concerns and enable public authorities to take due account of such concerns.").

[171] *See generally* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest, in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 39 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) (noting that strict application of the Atlantic forest protective legislation "would have kept the Atlantic Forest from shrinking to less than 8 percent of its original size.").

[172] *See* Meeting of the Executive Board of the Clean Development MECHANISM, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty-Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities*, at 5, U.N. DOC CDM-EB-35 (Oct. 19, 2007) ("12. Apply the following procedure: (...) If an alternative does not comply with all mandatory applicable legislation and regulations then show that, based on an examination of current practice in the region in which the mandatory law or regulation applies, those applicable mandatory legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread, i.e. prevalent on at least 30% of the area of the smallest administrative unit that encompasses the project area;").

Understanding the biome's geography and current demographical patterns as well as being able to visualize the remaining forested area is of especial relevance in the analysis of challenges and obstacles for successful carbon forest markets. In that sense, as illustrated in figure 1 above, the Atlantic Forest biome ranges from the northermost part of Brazil all the way to the southern part of the country along the east coast.[173] But a smaller portion of the biome also spans over parts of Argentina and Paraguay. Altogether, the region comprises a total area of more than 1.300.000 km^2 (table 1), out of which 1.110.182 km^2 in Brazil. Within Brazil, the biome represents 13,04% of the country's territory, encompassing 17 out of the 26 Brazilian states.[174]

As already mentioned above, out of the total area encompassed by the Atlantic Forest biome, only a minor fraction remains preserved (precisely 7.26% according to the most up-to-date figures extracted in 2005).[175] That is indicative that traditional enforcement and compliance instruments to the command-and-control system are ineffective.[176] Thus, examining possibilities to maximize the potentials of forest carbon markets can contribute to turn them into effective tools of environmental policy in Brazil for a biome that combines unique geography with high-density demographical patterns for the reasons stated as follow: first, 67% of the Brazilian population resides within the biome's confines, which translates into 120 million people in more than 3,400 towns throughout the biome, which corresponds to 61% of the existing towns in Brazil, and out of which 2,528 of them - or 75% - have their area completely within the Atlantic Rainforest biome[177]; second, the forest influences the water cycle, soil fertility,

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[173] *See generally* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest, in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 35 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) (explaining that the Atlantic forest "encompassed all or part of 17 states: Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul, Goiás, and Mato Grosso do Sul.").

[174] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 7 (2008), *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

[175] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

[176] *See generally* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest, in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 39 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) (pointing out to the lack of enforcement and compliance of the Atlantic Forest protective legal framework).

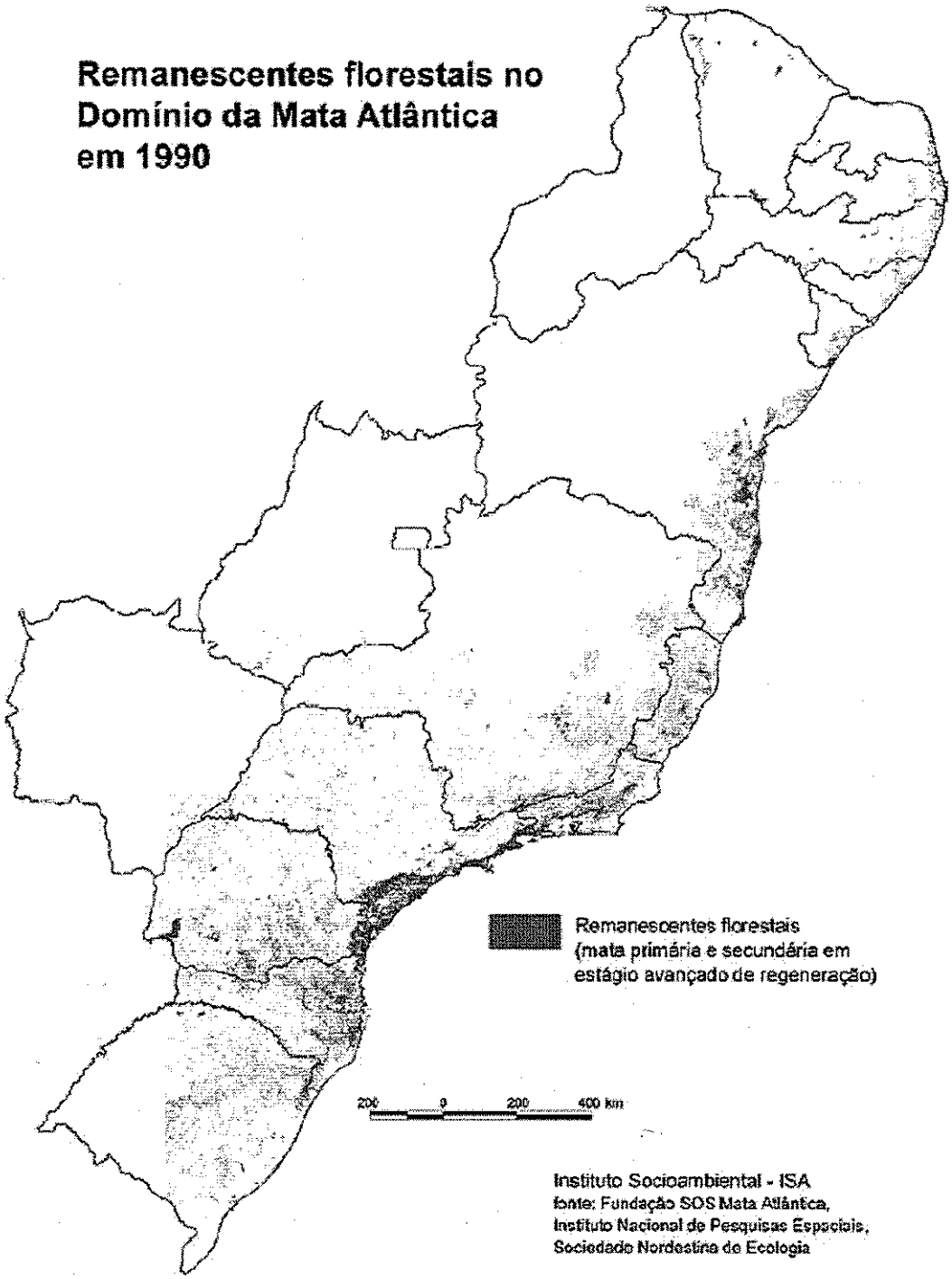
[177] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, Intro. (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2_005.pdf (last visisted Jun. 23, 2008).

controls the climate, protects the areas close to mountainous terrains and preserves an immense historical and cultural patrimony;[178] finally, this region is also home to many traditional and local communities and is responsible for supplying potable water for millions of people inhabiting the region.[179] All of the above stated functions and attributes, crucial not only for almost three fifths of the Brazilian population, but also for the proper functioning of the ecosystem itself, are sustained by merely 7.26% of remaining forested areas distributed geographically as shown in green in Figure 2 below:

Figure 2:

[178] *See* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 153 (Beto Ricardo and Maura Campanili eds., 2008).
[179] Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001*, 24-25 (2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/54.pdf (last visited Jun. 17, 2008) (providing the biodiversity numbers for the Atlantic Rainforest in both fauna and flora).

Mapa 2 – Remanescentes florestais no Domínio da Mata Atlântica em 1990



Source: Social-Environmental Institute, SOS Atlantic Rainforest Foundation, National Institute for Space Research and Northeastern Ecology Society.

Notwithstanding, this small intact portion left is not sufficient to the well functioning of the ecosystem as a whole[180] and to serve as a safe habitat for all the 120 million dwellers inhabiting the region. As a matter of fact, nature is responding negatively to over 500 years of unsustainable land-use practices. For instance, just of the months of November and December of 2008, unusual quantities of rainfall, much above the historical average, resulted in dreadful mudslides throughout the southern region of the Atlantic Rainforest biome, killing many people that have historically settled along hills and mountainous terrains that were once protected by the forest.[181] The risks associated to the erosion process resulting from centuries of unsustainable land-use practices and demographical policies[182] augment the significance of maximizing the efficiency of forest markets operating as conservation, preservation and restoration policies.[183]

iv. Colonial History and the Socio-Economical Profile

Brazil was originally occupied by Portuguese colonists in the 16th century, in an expedition fleet led by Pedro Álvares Cabral, anchoring on the country's east coast on

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[180] For instance, from a total of 473 endangered species listed by the Brazilian Ministry of Environment, 269 are from the Atlantic Rainforest biome. *See* Ministério do Meio Ambiente [Ministry of Environment] Map of the Total Number of Endangered Species per Biome, *available at* http://www.mma.gov.br/port/sbf/fauna/index.cfm.

[181] *See* The Associate Press, *Brazil: Death Toll Rises in Flooding*, N.Y. TIMES, November 26, 2008, available at http://www.nytimes.com/2008/11/26/world/americas/26web-briefs-003.html?_r=1&scp=1&sq=flood%20brazil%20santa%20catarina&st=cse (stating that in the south part of Brazil, in the State of Santa Catarina, "[m]ost of the dead were killed in mudslides that swept away homes and business, and more than 54,000 people were displaced, civil defense officials said."). *See also* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 268 (U. Calif. Press 1995) (1995) (reporting that farming uphill and downhill was a major cause of mud slides in the State of Minas Gerais portion of the Atlantic Rainforest region).

[182] *See* Márcia Makiko Hirota, *Monitoring the Brazilian Atlantic Forest Cover*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 60, 61 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Real estate development is also the major factor contributing to the degradation of coastal areas, *restingas*, and mangrove forests.").

[183] *See generally* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC'S FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007: SYNTHESIS REPORT 36 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC Fourth Assessment Report] (At continental, regional and ocean basin scales, numerous long term changes in other aspects of climate change have also been observed. Trends from 1900 to 2005 have been observed in precipitation amount in many large regions. Over this period, precipitation increased significantly in eastern parts of North and South America, northern Europe and northern and central Asia whereas precipitation declined in the Sahel, the Mediterranean, southern Africa and parts of southern Asia. Globally, the area affected by drought has likely increased since the 1970s.").

April 21, 1500.[184] The arrival and settlement of European colonizers launched, thereafter, centuries of intense and unsustainable exploitation of the Atlantic Rainforest's natural resources.[185] That is supported by the aforementioned official and current data reporting that merely 7.26% of the biome remain preserved.[186]

At the time of discovery, in 1500, a letter sent back to the Portuguese King dom Manuel from the expedition's official rapporteur demonstrates that the colonizers' first impression was one of astonishment with the natural beauty and the richness of the forest's flora.[187] Upon arrival of the Portuguese colonists, relatively populated indigenous communities were already settled in the Atlantic Rainforest biome, but there is no concrete evidence of them degrading the forest.[188] Therefore, for the purpose of this section, the analysis' baseline is set by the official recorded date of first European contact with the region: April 21, 1500.[189]

In that sense, corroborating Portuguese excitement with the splendor of the region, they named the country after a native tree, at that time abundant in the Atlantic Rainforest biome, the "Pau-Brasil".[190] That tree became the object of the first wave of

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[184] The Portuguese expedition fleet was led by Pedro Álvares Cabral and first arrived in the Brazilian town of Porto Seguro, Bahia State, on April 21st, 1500. *See generally* JOÃO CAPISTRANO DE ABREU, CAPÍTULOS DE HISTÓRIA COLONIAL [CHAPTERS OF COLONIAL HISTORY] 35-38 (1928) (detaling the history behind the Portuguese expedition led by Pedro Alvares Cabral, the first one arriving in Brazil).

[185] *See* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 36 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("It was shortly after the Europeans discovered Brazil in 1500 that deforestation began with the large-scale exploitation of brazilwood (*Caesalpinia echinata*), then abundant in the coastal forests from Rio de Janeiro presumably all the way to Ceará.").

[186] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

[187] *See* EDUARDO BUENO, PAUL-BRASIL 88 (Axis Mundi Editora 2002) (2002) (BRAZ.) (describing that Pero Vaz de Caminha, the rapporteur in the Portuguese expedition fleet that first arrived in Brazil, once confronted with the Atlantic Forest, reported in his letter a luxuriant and vast forest. According to the author, it was hard for Caminha to describe the forest, because he was confused by the forest's splendor, having stated that the trees were many, gigantic, multifarious and incredibly green.

[188] *See* JOÃO CAPISTRANO DE ABREU, CAPÍTULOS DE HISTÓRIA COLONIAL [CHAPTERS OF COLONIAL HISTORY] 19-22 (Sociedade Capistrano de Abreu 1928) (1928) (BRAZ.) (listing and describing the indigenous communities and their habits prior to the Portuguese colonization) *see also* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001*, 18 (2001) (reporting that numerous indigenous communities lived in the Atlantic Rainforest biome practicing agriculture, but highlighting the existence of testimonies from travelers and historians pointing out to no evidence of any kind of forest degradation).

[189] *See generally* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 36 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("The destruction of the Atlantic Forest started early. Prehistoric indigenous communities, who inhabited some areas of forest for at least 11,000 years, already practiced a rudimentary form of agriculture; however, any impact they may have had on the great forest is not perceptible today.").

[190] In one of the most comprehensive studies about the origins of the name "Brazil", Adelino D'Azevedo attests that Brazil is the name of a red dye. Therefore, due to the abundance of the Pau-Brasil tree in the

intense commercial exploitation, launching the degradation process of the Forest.[191] The Pau-Brasil tree was of enormous value back in the 16th and 17th centuries due to its reddish texture from which Europeans extracted a red paint commonly used to color textiles.[192] The lumbering of the Pau-Brasil dyewood lasted for more than two and a half centuries and constituted the first natural resource of interest to European settlers[193] driven by high profits and low, if none, care to the Atlantic Forest's ecological attributes.[194] But lumbering was not limited to *pau-brasil*. Other high value trees were heavily logged to fulfill the necessities of the naval, furniture and construction industries, among other uses.[195]

Starting with the lumbering of Pau-Brasil and other high value trees, the history of the Brazilian colonization process was characterized by different cycles of natural resources exploitation.[196] Up until the beginning of the twentieth century, exploitation

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Atlantic Forest where the Portuguese first arrived, the Brazil name became a simplification of the name attributed to the Pau-Brasil tree. *See generally*, ADELINO JOSÉ DA SILVA D'AZEVEDO, ESTE NOME: BRAZIL [THIS NAME: BRAZIL] 263, 461 (Agência-Geral do Ultramar 1967) (1967) (PORT.).

[191] *See generally* Roberta M. Delson & John P. Dickenson, *Perspectives on Landscape Change in Brazil*, 16 J. LATIN-AM. STUD. 101, 103 (1984), *available at* http://www.jstor.org/stable/157289 (Within a few years of the discovery, the abundant praise gave way to sober calculations of how the new land might be made profitable to the Crown. A dichotomy arose between those predisposed toward quick, speculative gain and those who advocated a more rational settlement, carefully analyzing existing resources. The former faction held sway at first, as the Crown awarded contracts to individuals willing to travel to Brazil and invest in lumbering in the thickly treed coastal forest.").

[192] EDUARDO BUENO, PAUL-BRASIL 17 (Axis Mundi Editora 2002) (2002) (BRAZ.). *See also* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 6 (U. Calif. Press 1995) (1995) (describing the *pau-brasil* as "a dyewood, called *ibirapitanga* – red tree – by the Tupi, who colored their cotton fibers with it. The Portuguese called it *pau-brasil*, probably from *brasa* – glowing coal. At the first cut, the core of the trunk displays a golden brilliance, then turns a bright orange-red. When thrust in water it immediately becomes reddish violet.").

[193] *See* Roberta M. Delson & John P. Dickenson, *Perspectives on Landscape Change in Brazil*, 16 J. LATIN-AM. STUD. 101, 103 (1984), *available at* http://www.jstor.org/stable/157289 ("By far the most profitable tree to cut was *Cesaelpinia echinata* or *pau brasil*, a dyewood from which the name of the country is derived. This tree represented the first extractive basis upon which the Brazilian economy was anchored, and its marketing set in motion a pattern of production for exportation which has only been effectively challenged since the late nineteenth century.").

[194] *See generally* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 364 (U. Calif. Press 1995) (1995) ("'Discovery' was breathtaking asserted to be the equivalent of conquest, 'conquest' was imbued with unlimited rights over the conquered, and the forest was reduced to booty.").

[195] Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001*, 24-25 (2001), *available at* http://www.socioambiental.org/banco_imagens/pdfs/54.pdf (last visited Jun. 17, 2008).

[196] CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 145 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) (explaining that the Brazilian economy "functioned in terms of the combination of international circumstances that favored whatever product it could supply and hence gave an illusory impression of wealth and prosperity. As soon as the particular combination of circumstances changed or the available natural resources were exhausted, production declined and withered away, making it impossible to maintain the life it had sustained.").

was almost exclusively confined within the Atlantic Rainforest biome.[197] It was not until the beginning of the 1900s that the development frontier was intensely expanded to the Savanna[198] and Amazon[199] biomes. Major natural resources exploitation cycles within the forest, known in the Brazilian history as "economic cycles"[200], included:

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[197] *See generally* CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 151-156 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) (explaining the ranchers' and farmers' preference over coastal land and inland not far from the coast throughout the 16th, 17th, 18th and 19th centuries, comprising areas within the Atlantic Rainforest biome for reasons ranging from proximity to ports of exportation to lands suitable for sugarcane, coffee, cotton and cacao); *see also* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 266 (U. Calif. Press 1995) (1995) ("Nearly all of the physical and economic transformations of the 1950s through the 1970s that might be called development were confined to the region of the Atlantic Forest. Very nearly all the investment of multinational and state-owned corporations came to be concentrated in the 'industrial triangle' formed by the cities of São Paulo, Belo Horizonte, and Rio de Janeiro.").

[198] *See* João Carlos Ker et al., *Cerrados: Solos, Aptidão e Potencialidade Agrícola* [Savanna: Soils, Suitability and Agricultural Potenciality], *in* CARGILL FOUND., PROCEEDINGS OF THE SYMPOSIUM ON MANAGEMENT AND CONSERVATION OF THE SAVANNA SOIL 1, 2 (Cassimiro Vaz Costa & Luiz Carlos Valadares Borges eds., 1992) (comparing the 1970 demographic census of the savanna biome with the 1990 one showing a twofold increase in the region's population and attributing it to a growing migration in search of new arable lands for agriculture).

[199] *See generally* Michael S. Giaimo, *Deforestation in Brazil: Domestic Political Imperative-Global Ecological Disaster*, 18 ENVTL. L. 537, 541-544 (1988) (laying down a chronology of Amazonian development efforts effectively launched in the post-World War II with the 1946 Constitution setting apart tax revenues to be invested in the Amazon region).

[200] *See generally* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 170 (U. Calif. Press 1995) (1995) ("The export 'cycles' so characteristic of Brazilian economic history, in which a product is produced successfully for a time, even though inefficiently, relying on the bounty of nature, but then falls out of world trade as that bounty grows scarce and as more efficient techniques of production fail to be applied, is largely the result of the inability to join together capital and proceed to more intensive exploitation and to shake off bureaucratic parasitism.").

agriculture[201] (sugarcane[202], coffee[203], cotton[204] and cattle ranching[205]), mining[206] and the industrialization process following the late 1920s Great Depression.[207]

Considering land was abundant, those different natural resources' exploitation phases had one similar characteristic: the disregard for the forest and its ecological attributes.[208] Over five centuries after the first wave of colonizers, the results of such unsustainable patterns of exploitation and settlement are reflected by, but not limited to, the following objective indicators: first, only less than ten percent of the biome remains preserved[209]; second, current high susceptibility of the region's dwellers to natural disturbances (floods, droughts, tornados)[210]; third, more than half of the Brazilian

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[201] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 26 (U. Calif. Press 1995) (1995) ("Agriculture was much more viable on forest soils. From the beginning, farming in the region of the Atlantic Forest – indeed, throughout the lowland areas of the continent – required the sacrifice of the forest.").

[202] *See* CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 166 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) ("Sugarcane was widely distributed throughout the colony. We find it all along the coastal fringe from the extreme north, in Pará, to the South, in Santa Catarina.").

[203] *See generally* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 178 (U. Calif. Press 1995) (1995) (noting that the expansion of coffee throughout the nineteenth century posed more threat to the Atlantic Forest than any other previous economic cycle).

[204] *See* CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 173 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) ("In the peak period of the early years of the nineteenth century, when Brazil took its place among the world's great cotton producers, cotton planting was widely spread throught Brazilian territory.").

[205] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 113 (U. Calif. Press 1995) (1995) (noting that cattle "spread out over forest land that had been farmed and was abandoned", preventing the regeneration of the forest).

[206] *See* CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 197 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) (1995) (noting that "in spite of the wealth produced by mining – most of which, incidentally, was drained out of the country – it has left so few traces, other than the wholesale destruction of natural resources wreaked throughout the mining districts…".).

[207] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 265 (U. Calif. Press 1995) (1995) (stressing how depression and the postwar launched a general feeling of economic development at any cost in the Brazilian domestic policies which eventually was concentrated mainly in the Atlantic Rainforest biome).

[208] *See generally* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 57 (U. Calif. Press 1995) (1995) (noting that "[t]he conservation of natural resources was to prove irrelevant in a society in which the conservation of human life was irrelevant.").

[209] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Periodo 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2005.pdf (last visisted Jun. 23, 2008).

[210] For instance, in the State of Santa Catarina with its territory within the Atlantic Rainforest biome, the Governor issued a decree constituting a technical and scientific working group to assess and propose droughts, floods and tornados mitigation policies. More importantly, this working group is set permanently to investigate the causes of growing natural catastrophes in the State, which are, in many cases, believed to have a direct relationship with human actions. *See* Universidade Federal de Santa Catarina (Federal University of Santa Catarina) [UFSC], *Researchers Get Together to Investigate the Causes of Growing Occurrence of Natural Catastrophes, available at* http://www.agecom.ufsc.br/index.php?secao=arg&id=8308 (last visited Jan. 21, 2009). *See* State Decree 1.940 (3 Dec. 2008), *available at* http://www.gruporeacao.sc.gov.br/index.php?option=com_content&task=view&id=17&Itemid=28 (last

endangered species are from the Atlantic Rainforest region;[211] and fourth, air, soil, water and costal pollution.[212] Warren Dean summarized over half-millennium of the Atlantic Rainforest exploitation periods as follow:

> "For five hundred years the Atlantic Forest has yielded easy pickings: parrots, dyewood, slaves, gold, ipecac, orchids, and timber for the profit of their colonial masters and, burned and ravaged, an immensely fertile layer of ashes that made possible an effortless, mindless, and unsustainable agriculture. Population grew and grew, capital "accumulated" while the forests disappeared; further capital was then "accumulated" – in barriers to the gullying of farmland, aqueducts, flood control and flood relief, dredging equipment, planted woodlands, and the industrialization of substitutes for hundreds of products once plucked freely in the wild. No restraint was observed during this half-millennium of gluttony, even though, almost from the beginning, solemn interdictions were intoned intermittently and in latter days, continually and frantically."[213]

For reasons ranging from technological innovation to the shift from an exclusively agrarian economy to investment in industrial growth after the Great Depression, each cycle arrayed from exponential augmentation to decline or even extinction.[214] The collapse of the Pau-Brasil cycle in the second half of 19th century was due to the development of synthetic dyes.[215] The gold rush was over when overexploitation led to the shortage of this precious metal in the Atlantic Forest

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visited, Jan. 21, 2009) (instituting a Reaction Group under which the Technical and Scientific Working Group was established).

[211] *See* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 153 (noting that out of 510 endangered species, 357 are found in the Atlantic Forest).

[212] *See* Marussia Whately, *Água* [Water], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 291, 292 (noting that clean and affordable water on the Atlantic Rainforest region (coastal area) is becoming increasingly rare). *See* Helena Ribeiro, *Poluição Urbana* [Urban Pollution], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 405, 405-408 (noting the problem of urban pollution in major metropolises on the Atlantic Rainforest including São Paulo); *see also* Márcia Makiko Hirota, *Monitoring the Brazilian Atlantic Forest Cover*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 60, 61 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Other forms of encroachment that directly or indirectly affect the Atlantic Forests are industrial or agricultural pollution of the air, water, and soil, oil spills, mining, the construction of new roads and highways, and energy projects such as hydroelectric power plants and gas pipelines.").

[213] WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 363 (U. Calif. Press 1995) (1995)

[214] *See* CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 144 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) (describing the cyclical nature of the history of the Brazilian economy).

[215] *See* EDUARDO BUENO, PAUL-BRASIL 36 (Axis Mundi Editora 2002) (2002) (BRAZ.) (noting that in 1856 when the English chemist Willian Henry Perkin developed a synthetic dye, the Pau-Brasil tree lost its value).

region.[216] Canefields were never gone, but faced major decline with the insertion of coffee plantations due to declining international sugar prices around 1850.[217] Finally, increasing urban sprawling attributed to the region's industrialization shift during the twentieth-century contributed to the aforementioned degraded scenario of few remaining preserved areas, the majority of the country's endangered species, along with air, water, soil and coastal pollution.[218]

That was a result of unsustainable exploitation patterns, an unfortunate landmark in each of those economic cycles. Lumbering of the *pau-brasil*, relying on native knowledge, the Tupi tribe, brandishing axes and by burning forested areas around trees degraded 6,000 square kilometers just in the first century.[219] Denudation of hillsides, burning the forest in the vicinity of mines and diversion of entire streams are illustrative of main degradation practices featuring the gold rush.[220] An intense slash-and-burn regime[221] followed by extensive monoculture crops (sugarcane[222] and coffee[223]) and,

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[216] *See* CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 148 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) ("The gold deposits, which had proved rich only on the surface of the soil, had been exhausted, and their exploitation was no longer profitable.").

[217] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 178 (U. Calif. Press 1995) (1995) (noting that international sugar market was only briefly favorable and, in contrast, coffee had the potential of much greater profits).

[218] *See generally* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 153; *See also* Marussia Whately, *Água* [Water], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 291, 292; *See also* Helena Ribeiro, *Poluição Urbana* [Urban Pollution], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 405, 405-408.

[219] WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 47 (U. Calif. Press 1995) (1995).

[220] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 98 (U. Calif. Press 1995) (1995) ("[T]he total volume of gold obtained during the eighteenth century would have overturned 4,000 square kilometers of the Atlantic Forest region.").

[221] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 26 (U. Calif. Press 1995) (1995) (describing the slash-and-burn regime, as follow: "[t]he technique was extremely simple: Near the end of the drier season the underbrush in a patch of forest, a hectare, more or less, was slashed, so as to dry it out, and the larger trees were ringd with stone axes. Then, just before coming of the rains, the area would be set afire, causing the enormous stock of nutrients stored in the forest biomass to fall to earth as ashes. A few of the largest trees that had resisted the fire would remain, scorched but standing. The rains washed the nutrients into the soil, neutralizing as well as fertilizing it. Planting was then carried out with no tool save a digging stick. Forest that had never fefore been burned was not only marvelously fertile but also free of the seeds of invasive plants, and therefore little weeding was necessary.")

[222] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 79 (U. Calif. Press 1995) (1995) ("Assuming a yield of 50 tons of cane per hectare and an extractive rate of 3 percent by weight, by 1700 sugarcane fields would have occupied about 120 square kilometers. This would have been land taken from forest, because sugarcane was thought to be cultivated only on forest soils.")

[223] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 188 (U. Calif. Press 1995) (1995) ("Supposing that 700 kilograms was the average yield per hectare, and supposing that the average grove was economically productive for twenty years, then it was necessary to clear for this purpose some 7,200 square kilometers of primary forest, the equivalent of 300 million tons of forest biomass gone up in smoke. This area equaled nearly 18 percent of the surface of the province of Rio de Janeiro, where four-fifths of this coffee was planted. To this must be

after the land was no longer suitable for plantation, the introduction of cattle ranching activities[224] contributed even further for the destruction of the Atlantic Forest. The general belief that plagues and diseases were associated with the forest was also responsible for large areas of forest clearance.[225]

Unplanned settlement, land-use and socio-economical policies based primarily on granting land freely and costless were additional to those unsustainable exploitation practices contributing to the destruction of the Atlantic Forest.[226] More recently, in the twentieth-century, in the post-Great Depression and World War II, the threats to the Atlantic Forest came from rapidly industrialization of the region accompanied by growing urban sprawling and demographic concentration.[227] The correlation between those factors and the pressures imposed upon the forest are illustrated by the facts of a landmark case in which the Brazilian Superior Court of Justice had to balance the preservation of the forest and a low-income community development.[228]

All in all, those extractive economic cycles translate into over five hundred years of unplanned settlements, land-use, economical and social policies characterized by the disregard to the environment.[229] Consequently, an area over twice the size and

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added the forest cleared for subsistence for the slave work force, which must have averaged 140,000 in number. Some unknowable portion of subsistence fields, possibly south-facing hillsides, may have been covered with primary forest."

[224] WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 113 (U. Calif. Press 1995) (1995) ("The deterioration of native pasture caused it to become, paradoxically, a scarce commodity. Therefore cattle spread out over forest land that had been farmed and was abandoned. These pastures were often called artificial, suggesting that they were planted to selected grasses, but that was never the case in the eighteenth century and was rare in the nineteenth. They were, instead, populated by whatever invasive native grasses found degraded farmland congenial.").

[225] *See* WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 103 (U. Calif. Press 1995) (1995) ("[I]t came to be the general belief that fevers emanated not only from swamps but also from the forest, so that much clearing came wrongheadedly to be carried out merely to *espantar as febres* – scare off the fevers.").

[226] WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 147 (U. Calif. Press 1995) (1995) ("It was a major cause of the destruction of the Atlantic Forest that government assigned no value to the land it so freely granted. Having consumed all the most promising primary forest in a given sesmaria, a grantee commonly sold it for a trifle and asked for another, which he normally experienced no difficulty in obtaining.").

[227] *See* Roberta M. Delson & John P. Dickenson, *Perspectives on Landscape Change in Brazil*, 16 J. LATIN-AM. STUD. 101, 114 (1984), *available at* http://www.jstor.org/stable/157289 ("A major feature, therefore, of twentieth-century change has been the introduction of factories, chimneys, dirt, pollution and other signs of 'progress' into the Brazilian scene.").

[228] In a landmark decision the Federal Superior Court of Appeals (the highest court of appeals on all non-constitutional matters), in balancing the Atlantic Rainforest preservation and an illegal condominium development for poor people, held in favor of the forest, while also acknowledging the social implications of such holding, but deciding that the houses should be demolished and that the forested area restored. S.T.J.P-2, REsp. No. 403.190-SP, Relator: Min. João Otávio de Noronha, 14.08.2006, (find at http://www.stj.gov.br/webstj/) (Brazil).

[229] *See generally* CAIO PRADO JR., THE COLONIAL BACKGROUND OF MODERN BRAZIL 155 (Suzette Macedo trans., Univ. Calif. Press 1967) (1963) ("The forests which had once covered most of the areas

population of France, with incalculable environmental resources and functions is tainted by a history of destructive socio-economical policies, constituting additional challenges to carbon forest markets.[230] In sum, on one hand, those additional challenges result into low availability of degraded land that can be converted into forest in light of increasing demographical pressures and the region's rising industrial and agricultural demand which, in turn, threatens the few remaining preserved areas.[231]

On the other hand, the described challenges have the potential to enhance the significance of a well-designed system of economic incentives as instruments of environmental policy, complementing an existing command-and-control regime.[232] Whether existing mechanisms - like the CDM of the Kyoto Protocol or voluntary markets - are appropriate to assist on conservation and regeneration of the Atlantic Forest in light of its socio-economical features, regulatory and institutional framework are the object of the analysis in the following sections and chapters. Prior to that, this study turns to the Atlantic Forest's climate change mitigation potential.

v. The Atlantic Rainforest's Potential Contribution to Emissions and Removals of Greenhouse Gases

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occupied by colonization, chosen for the natural fertility of their residual soils, rapidly disappeared in the destructive wake of the fires that devoured them.").

[230] *See generally* Carlos Eduardo Frickmann Young, *Socioeconomic Causes of Deforestation in the Atlantic Forest of Brazil*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 103, 104 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("In general, land occupation cycles have three stages. First comes a period of population growth and rapid expansion during which agricultural activities drive deforestation. Next comes a slowing of the economic and demographic growth but with deforestation continuing in response to other pressures, such as land speculation and expansion of crop and pastureland. The final stage is a period of contracting economic and demographic pressures, as natural resources become depleted or various techniques are used to increase agricultural output while reducing the need for manual labor.").

[231] *See* Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, Intro. (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2_005.pdf (last visisted Jun. 23, 2008) (stressing that the industrialization process led to urban sprawling of major Brazilian metropolis in within the Atlantic Rainforest biome which, in turn, destroyed most of the region's natural vegetation. In addition, referring to the data from the Brazilian Institute of Geography and Statistics, the same report states that 61% of the municipalities in Brazil are located within the Atlantic Rainforest biome).

[232] *See* Carlos Eduardo Frickmann Young, *Socioeconomic Causes of Deforestation in the Atlantic Forest of Brazil*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 103, 115-116 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) (drawing an outlook for the future of the Atlantic forest, highlights the importance of some new laws and regulations adding to the current command-and-control system as well as the importance of some economic incentives and "some financial reward for the global benefits provided by the Atlantic Forest in terms of carbon sequestration and biodiversity preservation. Even though the resources available for such compensation may be limited in the short term, many conservationists, policymakers, and others hope that markets will be developed in the future that can contribute significantly to the preservation of forest and, in the future that can contribute significantly to the preservation of forests and, in the case of carbon sequestration, to their recovery.").

Having scrutinized the forest's characteristics, this subsection turns to the region's contribution to emissions and potential for removals of greenhouse gases. In the absence of a greenhouse gas inventory specific to the Atlantic Rainforest biome, assumptions are drawn from the region's ecological and socio-economical features and current scientific data on Land Use, Land-Use Change and Forestry ("LULUCF") reported by the IPCC.[233] The information collected from that examination is then combined with the data in the Brazilian Inventory on Greenhouse Gas Emissions presented to the Secretariat of the UNFCCC.[234]

The result of such analysis, on the one side, helps to understand how the biome can act as a source of greenhouse gases. On the flip side, how conservation and preservation policies and, above all, restoration practices have the potential to turn the region into a major sink of greenhouse gases. Identifying the region's greenhouse gases potentials and threats due to land-use changes and forestry activities brings about the benefits of maximizing the designing of alternative auxiliary forest carbon markets and the implementation of existing ones.

Over the last five centuries, the history of the Atlantic Forest cultivation was, as described above, tainted by the slash-and-burn method.[235] That leads to the first assumption: most of the carbon stocked in the region's flora and soil was released in the format of CO_2 long before the 1990 reference year.[236] Corroborating this assumption, a report from the National Institute for Space Research ("INPE") reveals that for the period of 1985-1990 roughly 93% of the biome was devastated.[237] The year of 1990 is the reference year for developed countries' greenhouse gases emissions from which an

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[233] Important technical and scientific information regarding land use, land-use change and forestry for this study is supported by the 2000 IPCC Special Report Land Use, Land-Use Change, and Forestry. *See generally* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), LAND USE, LAND-USE CHANGE, AND FORESTRY, (Cambridge Univ. Press, Robert T. Watson et al, eds. 2000).

[234] CLIMATE CHANGE SECRETARIAT, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE ("UNFCCC"), BRAZIL'S INITIAL NATIONAL COMMUNICATION TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (1994), *available at* http://unfccc.int/resources/docs/natc/brazilnc1e.pdf.

[235] *See* above Chapter 2.

[236] *See generally*, PHYLLIS BUELL AND JAMES GIRARD, CHEMISTRY FUNDAMENTALS – AN ENVIRONMENTAL PERSPECTIVE 346 (Jones and Bartlett 2003) ("As tree grow, they take carbon dioxide from the atmosphere in the process of photosynthesis; when they decay or are burned in forest fires, carbon dioxide is released back into the atmosphere.").

[237] Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) [INPE], *Atlas dos Remanescentes Florestais da Mata Atlântica Período 2000-2005*, 74 (2008) *available at* http://mapas.sosma.org.br/site_media/ATLAS%20MATA%20ATLANTICA%20-%20RELATORIO2000-2_005.pdf (last visisted Jun. 23, 2008).

average of 5.2% reduction is expected.[238] It is also a baseline set by CDM forestry provisions upon when the land could not be forested to be eligible as a forestry project-activity.[239] The rationale was to avoid that forest carbon markets could stimulate deforestation to allow for future reforestation practices in exchange of carbon credits.[240] And that is due to the fact that fast-growing homogeneous forests have higher rates of carbon sequestration than old-established mature ones.[241] In the later case the carbon offset potential is on forest's carbon storage capacity (avoided deforestation) as oppose to carbon removal.[242] But as examined earlier avoided deforestation activities are not yet permitted under the Kyoto Protocol regime.[243]

In that sense, under the CDM legal framework two forestry activities are permitted: "afforestation" and "reforestation":[244] The difference merely being that an afforestation project assumes that the land was not forest or has not been a forest for at least fifty years, while reforestation presupposes that a forested land was subsequently deforested, as long as the land was not forested on 31 December 1989. The FAO Global Forest Resources Assessment defines afforestation as the "planting of trees on lands that was not previously forested, or through natural expansion of forests", and reforestation as "[w]here part of the forest is cut down but replanted (. . . .), or where the

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[238] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Annex B, Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[239] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶ 13, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

[240] *See* Janine Bloomfield & Holly L. Person, *Land use, Land-use Change, Forestry, and Agricultural Activities in the Clean Development Mechanism: Estimates of Greenhouse Gas Offset Potential,* 5 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 9, 12 (2000) ("There has been concern that LUCF projects within the CDM will lead to a replacement of mature forest with fast-growing tree plantations.").

[241] *See* Janine Bloomfield & Holly L. Person, *Land use, Land-use Change, Forestry, and Agricultural Activities in the Clean Development Mechanism: Estimates of Greenhouse Gas Offset Potential,* 5 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 9, 12 (2000) ("Plantations generally have higher rates of carbon sequestration than mature forests; that is, the amount of carbon in trees increases rapidly in plantations, particularly in those managed for maximum biomass production, while in mature forests the uptake may be approximately balanced by mortality.").

[242] *See* Janine Bloomfield & Holly L. Person, *Land use, Land-use Change, Forestry, and Agricultural Activities in the Clean Development Mechanism: Estimates of Greenhouse Gas Offset Potential,* 5 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 9, 11 (2000) ("Mature forests can yield carbon benefits through their conservation – leaving the forests standing prevents the CO2 emissions that would have occurred through deforestation. Avoiding deforestation also offers many environmental benefits in terms of biodiversity, water and air quality, and maintenance of local climate.").

[243] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29 – Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶ 1.

[244] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29 – Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶ 1(b) and ¶ 1(c).

forest grows back on its own within a relatively short period (natural regeneration)."[245] In practice, CDM forest project developers commonly use those terms as synonyms as long as the proposed area meets the 1990 baseline requirement of not being forested.[246]

In light of the diversity of the Atlantic Rainforest biome, mixing well-established industrial zones with areas of environmental preservation, it is reasonable to assume that forest carbon markets have, in principle, the potential to stimulate environmentally sound practices in many areas of the biome. Taking into consideration that tropical forests have much higher biodiversity rates than temperate forests or homogeneous commercially planted formations, their regeneration process is more complex[247]. Therefore, natural regeneration projects tend to be more burdensome and of less commercial value to a project developer than a fast-growing tree plantation, considering the later has an additional advantage of profiting not only from the commercialization of carbon forest credits but also from supplying wood resources to the industrial sector.[248] Nonetheless, an assessment on the potentialities of carbon forest mechanisms for the Atlantic Forest is still dependent upon a thoroughly understanding of the biome's capacity to remove and contribution to emissions of greenhouse gases.

For that, this study turns to the 1994 Brazilian Inventory on Greenhouse Gas Emissions presented to the UNFCCC. Based on that inventory, approximately two thirds of the country's emissions derive from land-use and forestry (*see* figure below). Since the information was based on data extracted from the period 1990-1994[249], that

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[245] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment: Towards Sustainable Forest Management*, Executive Summary, xiv (FAO Forestry Paper 147, 2006), *available at* ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resource Assessment 2005*]

[246] *See generally* United Nations Framework Convention on Climate Change ("UNFCCC") Official Homepage, http://cdm.unfccc.int/methodologies/ARmethodologies/index.html (last visited Jan. 22, 2009) (providing a list of proposed forestry methodologies in which the terms " afforestation" and " reforestation" are commonly used as synonyms).

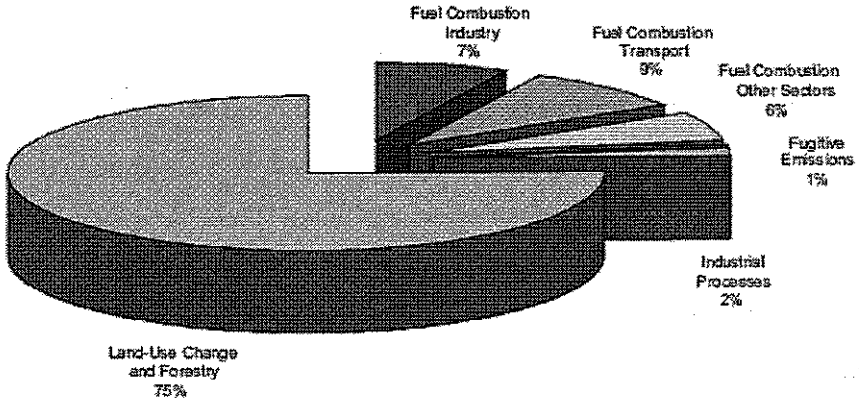
[247] WAREN DEAN, WITH BROADAX AND FIREBRAND – THE DESTRUCTION OF THE BRAZILIAN ATLANTIC FOREST 234 (U. Calif. Press 1995) (1995) (referring to the differences between re-creating temperate and tropical/sub-tropical forests).

[248] *Compare* AES-Tiete Afforestation/Reforestation Project Activity Around the Borders of Hydroeletric Plant Reservoirs, *Executive Board of the Clean Development Mechanism*, U.N. DOC FCCC/SB/2000/XX, *available at* http://cdm.unfccc.int/methodologies/ARmethodologies/publicview.html?meth_ref=ARNM0034, *with* Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil, *Executive Board of the Clean Development Mechanism*, U.N. DOC, *available at* http://cdm.unfccc.int/methodologies/ARmethodologies/publicview.html?meth_ref=ARNM0015-rev (illustrating the lower overall incentives of native subtropical forest projects in comparison to homogeneous reforestation forest projects).

[249] CLIMATE CHANGE SECRETARIAT, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE (" UNFCCC"), BRAZIL'S INITIAL NATIONAL COMMUNICATION TO THE UNITED NATIONS FRAMEWORK

leads to another assumption: a substantial portion of the greenhouse gases emissions from land-use and forestry come from the most recent overexploited biomes: the Savanna and the Amazon. In fact, that is corroborated by a report from the Woods Hole Research Center.[250] The figure below illustrates the country's emissions in percentage by sector in 1994 (the only inventory submitted by Brazil thus far):

Figure 2.2- CO_2 emissions by sector - 1994



Source: *Brazil's Initial National Communication to the UNFCCC*

Still, if vast portions of the Atlantic Rainforest biome were once cleared by slash-and-burn methods releasing large quantities of carbon dioxide, why those emissions are disregarded by the current climate change regime? The logical answer is that it was not until the post-Industrial Revolution that high concentrations of greenhouse gases in the atmosphere became a problem.[251] Secondly, the scientific knowledge establishing causation between human induced land-use and forestry practices to increasing global temperatures is relatively new in comparison with the devastation history of the Atlantic Forest.[252]

CONVENTION ON CLIMATE CHANGE, Intro. (1994), *available at* http://unfccc.int/resource/docs/natc/brazilnc1e.pdf.

[250] DANIEL NEPSTAD, THE WOODS HOLE RESEARCH CENTER: REED – REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION – THE COSTS AND BENEFITS OF REDUCING CARBON EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN THE BRAZILIAN AMAZON, 7 (2007), *available at* http://www.whrc.org/resources/published_literature/pdf/WHRC_REDD_Amazon.pdf, (last visited Jun. 10, 2008) ("Roughly two thirds of Brazil's annual carbon emissions come from deforestation, mostrly in the Amazon...").

[251] The first major international conference on climate change was in 1979. *See* World Climate Conference, Geneva, Switz., Feb. 12-23, 1979, *Declaration of the World Climate Conference*, at 2, U.N. DOC IOC/SAB-IV/INF.3.

[252] *See* Rômulo Silveira da Rocha Sampaio, *Seeing the Forest for the Treaties*, 31 FORDHAM INT'L L.J. 634, 634-635 (2008) (describing the history of the consolidation of the scientific knowledge liking human-induced forestry practices to global climate change).

Therefore, based on the aforementioned assumptions it is possible to conclude that current emissions from land-use change and forestry on the Atlantic Rainforest biome are insignificant compared to the Savanna and mainly the Amazon biomes.[253] That leads to a whole new assumption: the remaining sources of greenhouse gases emissions listed in the figure above (industrial processes, solvent and other product use, agriculture, energy and waste) come from the Atlantic Rainforest biome. That is assumed in light of the aforementioned industrial and agricultural concentration of the region.[254] But further analysis of this conclusion falls outside the scope set forth this paper and is mentioned in this section with the sole purpose of reinforcing the potentialities of market-based forest mechanisms for a region that was once covered with forest and has currently vast areas deforested. On the contrary, that is not the case for major portions of the Amazon and Savanna biomes, for instance, faced with heavily deforestation practices in the past two decades. For those areas, because in most cases they do not meet the CDM forestry 1990 non-forest baseline requirement, they have to rely inevitably on alternative market mechanisms that allow for avoided deforestation activities.[255]

In sum, based on the data and assumptions raised in this section, the scenario for carbon forest market opportunities in the Atlantic Rainforest seems to be a favorable one. That is due to a combination of factors: first, because the data from the Brazilian National Inventory reveals that two thirds of the country's emissions come from land-use change and forestry, but they are not from the Atlantic Rainforest biome; and, second, because most of the region was either deforested already on 31 December 1989 or had not been forested for at least fifty years. Under the Kyoto regulated market, then, vast parts of the Atlantic Forest meet *a priori* the definition of afforestation and reforestation project-activities set forth by the CDM regulatory regime. Moreover, if not

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[253] Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 228 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("During the 1980s, deforestation in Latin America alone produced a net carbon flux into the atmosphere on the order of 0.3 Pg C a year. This amount rose to 0.4 Pg C a year through the 1990s as a result of additional deforestation of more than 4 million hectares a year. Of this total, 0.2 Pg C resulted from deforestation in Brazilian Amazonia. Real emissions were certainly higher, because emissions from forest fires and logging were not included in the calculation."

[254] *See* above Chapter Chapter 2.d.iv.

[255] Eduard Merger & Alwyn Williams, *Comparison of Carbon Offset Standards for Climate Forestation Projects Participating in the Voluntary Carbon Market*, UNIVERSITY OF CANTERBURY 1, 7 (2008), *available at* http://www.fore.canterbury.ac.nz/research / ("As Climate Forestation Projects are still being developed, they have moved to the Voluntary Carbon Market. Here, stringent project management rules are absent.").

under the CDM forestry market, the stage of the Atlantic Forest degradation indicates opportunities under alternative carbon forest markets, considering their similar basic nature: provide credits for either conserving existing forested areas or transforming non-forested to forested areas.[256] Notwithstanding, at this stage of the study an optimistic view of carbon forest market opportunities for the Atlantic Forest is premature and still dependent upon a more thorough examination of different factors.

3. The Evolution of Forest International Economic Policy Instruments in the Context of Climate Change

The direct and formal relantionship between unsustainable forestry practices and global climate change goes back at least to the late 1970s. Since the Declaration of the World Climate Conference in 1979, the international community has acknowledged that deforestation and changes in land use, such as agricultural and pastoral practices, are contributing to the increased amount of CO_2 in the atmosphere.[257] In 1989, the Noordwijk Declaration on Atmospheric Pollution and Climatic Change recognized a growing international preoccupation with the alteration of the composition of the Earth's atmosphere due to anthropogenic activities;[258] stressed the importance of sustainable forestry, reforestation, afforestation, and conservation activities;[259] and called for a global increase in net forest growth of 12,000,000 hectares per year in the

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[256] *See generally* Charlotte Streck et al., *Climate Change and Forestry: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 3, 7 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Assigning value to emission reductions or removals carbon storage) by creating tradable carbon credits is one of the most developed and promising approaches for tapping the forestry sector in the fight against climate change(...). (...) In return for their payments, investors or carbon purchasers receive a right to the carbon credits generated by the project.").

[257] *See* World Climate Conference, Geneva, Switz., Feb. 12-23, 1979, *Declaration of the World Climate Conference*, at 2, U.N. DOC IOC/SAB-IV/INF.3 ("[W]e can say with some confidence that the burning of fossil fuels, deforestation, and changes of land use have increased the amount of carbon dioxide in the atmosphere by about 15 percent during the last century and it is at present increasing by about 0.4 percent per year.").

[258] *See* The Ministerial Conference on Atmospheric Pollution and Climate Change, Noordwijk, Neth., Nov. 7, 1989, *The Noordwijk Declaration on Atmospheric Pollution and Climate Change*, ¶¶ 1-3, *reprinted in Selected International Legal Materials on Global Warming and Climate Change*, 5 AM. U. J. INT'L L. & POL'Y 513, 592-601 (1990).

[259] *See* The Ministerial Conference on Atmospheric Pollution and Climate Change, Noordwijk, Neth., Nov. 7, 1989, *The Noordwijk Declaration on Atmospheric Pollution and Climate Change*, ¶ 9, *reprinted in Selected International Legal Materials on Global Warming and Climate Change*, 5 AM. U. J. INT'L L. & POL'Y 513, 592-601 (1990).

beginning of the twenty-first century.[260] Shortly after the first assessment report of the IPCC, the Second World Climate Conference, held in Geneva from October 29th to November 7th, 1990, called upon the international community to take measures to increase "sinks" of greenhouse gases.[261]

This was the situation with respect to forests and forestry leading up to the 1992 UNFCCC, which is the formal and fundamental pillar of the current climate change legal regime. In addition to general norms and principles, the UNFCCC laid the ground for the developed countries, based on the principle of common but differentiated responsibility, to adopt in the 1997 Kyoto Protocol, binding commitments envisioning quantified reductions and limitations on the emissions of greenhouse gases.

a. The Introduction of Forest and Forestry Activities Into the Climate Change Legal Regime

The UNFCCC, the formal and fundamental multilateral international agreement in the climate change legal regime, was adopted in New York on May 9th, 1992, and fully launched during the 1992 United Nations Conference on Environment and Development ("UNCED") in Rio de Janeiro, Brazil, often called "The Earth Summit."[262] The UNFCCC expressly recognizes the role and importance of "sinks" and "reservoirs" of greenhouse gases in mitigating global warming.[263]

According to the UNFCCC's handbook, "[a] sink is a process, activity or mechanism that removes [greenhouse gases] from the atmosphere; a reservoir is part of the climate system that enables a [greenhouse gas] to be stored."[264] The characterization of forestry and forest activities as types of sinks and reservoirs of CO_2 was established

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[260] *See* The Ministerial Conference on Atmospheric Pollution and Climate Change, Noordwijk, Neth., Nov. 7, 1989, *The Noordwijk Declaration on Atmospheric Pollution and Climate Change*, ¶¶ 21, *reprinted in Selected International Legal Materials on Global Warming and Climate Change*, 5 AM. U. J. INT'L L. & POL'Y 513, 592-601 (1990).

[261] *See* Climate Change Fact Sheet 221, http://unfccc.int/resource/ccsites/senegal/fact/fs221.htm (last visited Oct. 14, 2007).

[262] *See* CLIMATE CHANGE SECRETARIAT, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE ("UNFCCC"), UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE HANDBOOK 19 (2006), *available at* http://unfccc.int/resource/docs/publications/handbook.pdf [hereinafter UNFCCC HANDBOOK].

[263] *See* United Nations Framework Convention on Climate Change, pmbl., May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[264] *See* SEBASTIAN OBERTHÜR & HERMANN E. OTT, THE KYOTO PROTOCOL: INTERNATIONAL CLIMATE POLICY FOR THE 21ST CENTURY 9, 131-32 (1999) (describing the science underpinning the relantioship between forests and CO_2 in the atmosphere).

by the above described scientific studies[265] that, in turn, inspired the climate change legal regime.[266] Although the UNFCCC makes some general references to promoting the enhancement of forests, sinks, and reservoirs of greenhouse gases,[267] the term "forestry" appears only once in the UNFCCC, and no legal definition is provided.[268]

b. The Legal Status of Forests and Forestry Activities Under the UNFCCC

The definitions relevant to the legal status of forests and forestry that gave legal support for activities under the climate change legal regime experienced two distinct phases. The first phase was characterized by the generic concepts of sink, reservoir, and source provided by the UNFCCC. The second phase is characterized by the more precise and specific notions of these terms provided by the Kyoto Protocol and subsequent Conferences and Meetings of the Parties.[269]

The UNFCCC's broad definitions for the terms sink,[270] reservoir,[271] and source[272] subsumed the concepts of forest and forestry; and as a result, they supported forestry project activities during the Activities Implemented Jointly ("AIJ") Pilot Phase.[273] The primary concern during the negotiations at the first session of the

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[265] *See* United Nations Framework Convention on Climate Change, art. 4(1)(d), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC] (setting forth biomass, forests, oceans, and other terrestrial, coastal, and marine ecosystems as examples of sinks and reservoirs of greenhouse gases).
[266] *See, e.g.*, *id.*
[267] *See id.* art. 4(1) (c).
[268] *See* Imke Sagemüller, *Forest Sinks Under the United Nations Framework Convention on Climate Change and the Kyoto Protocol: Opportunity or Risk for Biodiversity?*, 31 COLUM. J. ENVTL. L. 189, 201 (2006) (explaining that "[a]s a framework convention, the UNFCCC includes only few broad references to the removal of [greenhouse gases] by sinks").
[269] For a discussion of the importance of developing clear definitions for terms such as "forests", "afforestation," "reforestation," and "deforestation," see Robert T. Watson & David J. Verardo, *Preface* to INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS 4 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].
[270] *See* United Nations Framework Convention on Climate Change, art. 1(8), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC] ("'Sink' means any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.").
[271] *See id.* art. 1(7) ("'Reservoir' means a component or components of the climate system where a greenhouse gas or a precursor of greenhouse gas is stored.").
[272] *See id.* art. 1(9) ("'Source' means any process or activity which releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas into the atmosphere.").
[273] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Berlin, F.R.G., Mar. 28 – Apr. 7, 1995, *Report of the Conference of the Parties on its First Session – Part Two: Action Taken by the Conference of the Parties at its First Session*, Decision 5/CP.1, ¶ 1(b), U.N. DOC FCCC/CP/1995/7/Add.1 (June 6, 1995) [hereinafter *COP-1 Report – Part Two*] ("[A]ctivities implemented jointly should be compatible with and supportive of national environment and development priorities and strategies, contribute to cost-effectiveness in achieving global benefits and could be

Conference of the Parties ("COP-1") in 1995 and the two subsequent sessions of the Conference of the Parties in 1996 and 1997 ("COP-2" and "COP-3", respectively) was defining quantified emissions reductions and limitations for developed countries.[274] Forest and forestry activities were primarily a cost effective way to make emissions reductions and limitations commitments feasible in the short term;[275] and as a result, they became an important negotiation tool for the imposition of cap commitments upon developed countries.[276] But, it was only during the fourth session of the Conference of the Parties ("COP-4"), which occurred almost seven years after the UNFCCC was promulgated, that a more specific legal regime for LULUCF began to emerge.[277]

Legally, though, at least until the Kyoto Protocol, Article 4(1)(d) of the UNFCCC provided the formal connection between forests and forestry and sinks and reservoirs. This provision called upon all Parties to promote the enhancement of sinks and reservoirs of greenhouse gases, including forests. On the one hand, such broad definitions allowed the legal status of forestry and forests to be easily inferred. Forests could be equated to sinks and reservoirs. On the other hand, because forests can also emit CO_2 when disturbed, they could also be deemed sources of greenhouse gases under the UNFCCC.[278]

For practical purposes, this means that whenever the climate change legal regime refers to enhancement, promotion, and sustainable management of sinks and

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conducted in a comprehensive maner covering all relevant sources, sinks and reservoirs of greenhouse gases . . . .").

[274] *See* Dean Anderson, *Rapporteur's Report of Workshop Presentations and Discussions, in* THE EMERGING INTERNATIONAL REGIME FOR CLIMATE CHANGE: STRUCTURES AND OPTIONS AFTER BERLIN 7, 7 (Michael Grubb & Dean Anderson eds., 1995) (stating that the Berlin Mandate, which refers to the outcome of the first session of the Conference of the Parties, "calls for a process to begin to strengthen commitments beyond 2000. This process should lead the industrialized world to 'elaborate policies and measures,' and to 'set quantified limitation and reduction objectives within specified time-frames, such as 2005, 2010 and 2020, for their anthropogenic emission.' Negotiations are to be completed by early 1997 in order that the results can be adopted at 'COP-3' . . . . The expectation is that a protocol or other legal agreement will be negotiated at COP-3 defining emission constraints for Annex 1 Parties potentially up to the year 2020.").

[275] *See* Joel N. Swisher, *Joint Implementation Under the U.N. Framework Convention on Climate Change: Technical and Institutional Challenges*, 2 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 57, 60 (1997) (noting that "there are low-cost opportunities for carbon storage in the forestry sector").

[276] *See id.* at 58 (stating that "to expect Annex I countries to implement too large a share of the emission reductions could by physically or technically infeasible and would likely be inefficient").

[277] *See* Conference of the Parties to the Kyoto Protocol, Buenos Aires, Arg., Nov. 2-14, 1998, *Report of the Conference of the Parties on its Fourth Session – Part Two: Action Taken by the Conference of the Parties at its Fourth Session*, Decision 9/CP.4, U.N. DOC FCCC/CP/1998/16/Add.1 (Jan. 25, 1999) (addressing LULUCF specifically).

[278] *See* United Nations Framework Convention on Climate Change, art. 1(9), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC]; Lavanya Rajamani, *Re-Negotiating Kyoto: A Review of the Sixth Conference of the Parties to the Framework Convention on Climate Change*, COLO. J. INT'L ENVTL. L. & POL'Y, 2000 Yearbook, at 201, 207 ("Forest can be sources, sinks, or reservoirs of [greenhouse gases].").

reservoirs, and calls for action to address anthropogenic emissions by sources, it is including forests and forestry activities.[279] This is important because the broadness of the definitions relating to forests and forestry in the period leading up to the Kyoto Protocol was conducive to there being no limitation on the activities that could be implemented under the AIJ Pilot Phase.[280] For this reason, forest and forestry activities during the AIJ Pilot Phase included afforestation, reforestation, conservation practices, and sustainable forest management.[281]

c. The Legal Status of Forests and Forestry Activities under the Kyoto Protocol and Subsequent Sessions of the Conference and Meeting of the Parties

After the Kyoto Protocol expressly embraced forest and forestry practices and narrowed the UNFCCC's broad definitions of sinks, reservoirs, and sources of CO_2,[282] negotiators faced the need to create a specific legal regime that could reconcile the interests of parties supporting such activities with the interests of parties opposing them.[283] With the scientific support provided by the IPCC[284] and the FAO[285] and the

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[279] *See generally* SEBASTIAN OBERTHÜR & HERMANN E. OTT, THE KYOTO PROTOCOL: INTERNATIONAL CLIMATE POLICY FOR THE 21ST CENTURY 9, 131-32 (1999) (discussing the term "sink" and highlighting that "[i]n general, forests have the highest sink potential, depending, however, on age and condition of the forest").

[280] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Berlin, F.R.G., Mar. 28 – Apr. 7, 1995, *Report of the Conference of the Parties on its First Session – Part Two: Action Taken by the Conference of the Parties at its First Session*, Decision 5/CP.1, ¶ 1(b), U.N. DOC FCCC/CP/1995/7/Add.1 (June 6, 1995) [hereinafter *COP-1 Report – Part Two*] (deciding that activities implemented jointly "could be conducted in a comprehensive manner covering all relevant sources, sinks and reservoirs of greenhouse gases").

[281] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Geneva, Switz., Jul. 8-19, 1996, *Review of the Implementation of the Convention and of Decisions of the First Session of the Conference of the Parties – Activities Implemented Jointly: Annual Review of Progress Under the Pilot Phase*, ¶ 13, U.N. DOC FCCC/CP/1996/14 (June 4, 1996) (reporting that there are five ongoing projects in forest preservation, restoration, or reforestation and four in afforestation).

[282] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 3(3)-(4), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[283] *See* FARHANA YAMIN & JOANNA DEPLEDGE, THE INTERNATIONAL CLIMATE CHANGE REGIME: A GUIDE TO RULES, INSTITUTIONS AND PROCDURES 123 (2004) ("The technical complexity, and high political stakes, of sinks issues contributed significantly to the breakdown of negotiations at The Hague at COP-6 part I.").

[284] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, The Hague, Neth., Nov. 13-25, 2000, *Report of the Conference of the Parties on the First Part of its Sixth Session – Part Two: Action Taken by the Conference of the Parties at the First Part of its Sixth Sssion*, Decision 1/CP.6 Annex, Note by the President of the Conference of the Parties at its sixth session, dated 23 November 2000, Box C, U.N. DOC FCCC/CP/2000/5/Add.2 (Apr. 4, 2001) ("Parties decide that for defining afforestation, reforestation and deforestation [forestry activities] the set of IPCC definitions shall be applied.").

technical expertise of the Subsidiary Body for Scientific and Technological Advice ("SBSTA"),[286] negotiators began shaping a more specific legal regime for addressing LULUCF.[287]

The idea behind the more specific legal regime was to make the UNFCCC's ultimate objective feasible by allowing developed countries to offset part of their emissions commitments through the joint implementation of project-based practices under flexibility mechanisms[288] and the promotion and enhancement of sinks and reservoirs of greenhouse gases domestically.[289] Articles 3(3) and 3(4) of the Kyoto Protocol mark the beginning of a specific regulatory regime aimed at dealing with LULUCF activities. The first decision to advance the mandate established by the aforementioned provisions was Decision 9/CP.4 of COP-4 in 1999. At first, the Parties opted for limiting LULUCF activities to afforestation, reforestation, and deforestation practices[290] while providing enough flexibility to allow for the inclusion of additional activities.[291] Afforestation and reforestation are both defined as the human-induced

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[285] *See id.* ("Parties agree that for the implementation of Article 3.3 [of the Kyoto Protocol], "forest" is defined in accordance with the Food and Agriculture Organization ("FAO") definition.").

[286] *See* Michael Grubb, *The Outcome of the Berlin Conference, in* THE EMERGING INTERNATIONAL REGIME FOR CLIMATE CHANGE: STRUCTURES AND OPTIONS AFTER BERLIN 2 (1995) (explaining that the Subsidiary Body for Scientific and Technological Advice ("SBSTA") is "the main interlocutor between the scientific world and the [UNFCCC] process" and noting that the SBSTA is different from the IPCC in that the SBSTA is restricted to translating scientific data and information into policy recommendations to the Conference/Meeting of the Parties).

[287] *See* SEBASTIAN OBERTHÜR & HERMANN E. OTT, THE KYOTO PROTOCOL: INTERNATIONAL CLIMATE POLICY FOR THE 21ST CENTURY 9, 132 (1999) (suggesting that the issue of sinks was problematic in that there was little information available for the purposes of making a decision).

[288] *See* Anita M. Halvorssen, *The Kyoto Protocol and Developing Countries – The Clean Development Mechanism,* 16 COLO. J. INT'L ENVTL. L. & POL'Y 353, 363 (2005) ("The Kyoto Protocol introduced three market-based , flexible mechanisms that enable Annex I Parties to meet part of their emission reduction commitments in a more cost effective manner. These mechanisms, also referred to as Kyoto Mechanisms, include emissions trading, joint implementation, and . . . clean development mechanism ("CDM"). The idea behind these mechanisms is that the cost of limiting emissions will differ from one region to another, yet the benefit for the atmosphere is the same, regardless of where the action is taken.").

[289] *See* Mathew Vespa, *Climate Change 2001: Kyoto at Bonn and Marrakech,* 29 ECOLOGY L.Q. 395, 409 (2002) (distinguishing domestic application of LULUCF from LULUCF in the CDM).

[290] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 3(3), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol] ("The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation . . . ."). Deforestation, when characterized as a LULUCF activity, refers to the practice of preventing or reducing deforestation. It also means, for developed countries only, accountability for CO_2 emissions as a result of deforestation practices domestically. *See* Pedro Moura-Costa & Marc D. Stuart, *Forestry-Based Greenhouse Gas Mitigation: A Short Story of Market Evolution,* 77 COMMONWEALTH FORESTRY REV. 191, 192 (1998).

[291] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 3(4), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol] ("The Conference of the Parties serving as the Meeting of the Parties to this Protocol shall, at its first session or as soon as practicable thereafter, decide upon modalities, rules and guidelines as to how, and which, additional human-induced activities related to changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soils and the

conversion of non-forested areas into forested land,[292] but they differ slightly: the definition of afforestation presupposes that the converted area has not been forested for at least fifty years,[293] while reforestation is limited to the conversion of non-forested areas that were not forested on December 31, 1989.[294]

Amidst intense political debate over conflicting interests,[295] the Parties agreed upon additional activities at the seventh session of the Conference of the Parties ("COP-7") in Marrakesh.[296] Revegetation, forest management, cropland management, and grazing land management were added as domestically conducted activities but excluded as jointly implemented activities.[297] The definitions of activities under the newly established LULUCF legal regime, although broad in nature,[298] were useful operational guidance on handling this form of accountability under the UNFCCC. Decision 16/CMP.1 of COP.MOP-1 provided definitions for the terms "forest," "afforestation," "reforestation," "deforestation," "revegetation," "forest management," "cropland management," and "grazing land management."[299]

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land-use change and forestry categories shall be added to, or subtracted from, the assigned amounts for Parties included in Annex I . . . .").

[292] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I),* Decision 11/CP.7 Annex, ¶ 1(b)-(c), U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter *COP-7 Report – Part Two (Volume I)*].

[293] *See id.* ¶ 1(b).

[294] *See id.* ¶ 1(c).

[295] *See* Lavanya Rajamani, *Re-Negotiating Kyoto: A Review of the Sixth Conference of the Parties to the Framework Convention on Climate Change*, COLO. J. INT'L ENVTL. L. & POL'Y, 2000 Yearbook, at 223 ("At COP-6, the Umbrella Group argued in favor of including additional activities in the first commitment period. However, the [Alliance of Small Island States ("AOSIS")] AND THE [European Union ("EU")] opposed it").

[296] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I),* Decision 11/CP.7, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter *COP-7 Report – Part Two (Volume I)*].

[297] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 16/CMP.1 Annex, ¶ 6, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[298] *See* Imke Sagemüller, *Forest Sinks Under the United Nations Framework Convention on Climate Change and the Kyoto Protocol: Opportunity or Risk for Biodiversity?*, 31 COLUM. J. ENVTL. L. 189, 201 (2006) (describing the definition of deforestation in the Marrakesh Accords as broad).

[299] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 16/CMP.1 Annex, ¶ 1, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

d. The Two Different Approaches to Accounting for Forests and Forestry Activities Under the Climate Change Legal Regime

Since developed countries were concerned that relying solely on domestic measures to comply with greenhouse gas emission reduction commitments could damage their national economies, the Kyoto Protocol envisioned accountability through market-based flexibility mechanism: emissions trading ("ET"), joint implementation ("JI"), and the CDM.[300] As a result, countries could pursue two possible approaches. Countries could account for LULUCF domestically and/or participate in afforestation and reforestation activities abroad.

i. Accounting for LULUCF Domestically

For some countries, accounting for LULUCF domestically could offset up to ten percent of national gross emissions. For others, due to demographics and land-use patterns, sequestration potentials from enhancement of sinks are limited.[301] As a consequence, at the Kyoto Protocol negotiations, accounting for LULUCF activities was a contentious issue that divided the Parties considerably and impaired the Parties' progress towards a common and satisfactory agreement.[302]

Through Decision 11/CP.7 of COP-7, the Parties addressed some of their previous concerns and requested that the SBSTA and IPCC develop, and elaborate on, guidelines, monitoring, and reporting methodologies.[303] Following the Parties' request, the IPCC issued the following reports: *Good Practice Guidance for Land Use, Land-*

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[300] *See generally* Tim Jackson et al., *The Language of Flexibility: Operational forms of Joint Implementation, in* FLEXIBILITY IN CLIMATE POLICY: MAKING THE KYOTO MECHANISMS WORK 16, 22-26 (Tim Jackson et al. eds., 2001) (discussing the flexibility mechanisms of the Kyoto Protocol).

[301] *See* G. CORNELIS VAN KOOTEN, CLIMATE CHANGE ECONOMICS: WHY INTERNATIONAL ACCORDS FAIL 74 (2004) ("Canada can claim 12 Mt C per year, the Russian Federation 33 Mt C, Japan 13 Mt C, and other countries much lesser amounts – Germany 1,24 Mt C, Ukraine 1.11 Mt C, and remaining countries less than 1.0 Mt C. Japan expects to use forestry activities to meet a significant proportion of its [Kyoto Protocol] obligation, while Canada can use forest management alone to achieve about one-fifth of its emissions reduction targets.").

[302] *See* MICHAEL GRUBB ET AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT 79 (1999).

[303] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶¶ 2-3, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

Use Change and Forestry[304] and *Definitions and Methodological Options to Inventory Emissions from Direct Human-Induced Degradation of Forests and Devegetation of Other Vegetation Types.*[305] The IPCC's work and the SBSTA's advice were based on the general principles governing accountability for LULUCF activities undertaken domestically by Annex I countries.[306]

Under this framework regulatory regime, which governs LULUCF accountability for the first commitment period,[307] a selected domestic forestry activity can result in the augmentation or the diminution of an Annex I Party's assigned amount.[308] The result depends on whether the practice constitutes a net sink or a net source of greenhouse gases.[309] Practices that are net sinks of greenhouse gases will increase the assigned amount, while practices that are net sources of greenhouse gases will decrease the assigned amount.[310] Accountable forestry activities include afforestation, reforestation, deforestation, revegetation, forest, cropland, and grazing land management.[311]

"Credits," which are awarded for any domestic improvement using one or more of the above-mentioned forestry activities, increase a Party's assigned amount for the first commitment period.[312] This is only true, though, if the party makes a formal and timely identification of the activities in its annual report[313] and the party demonstrates

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[304] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, GOOD PRACTICE GUIDANCE FOR LAND-USE, LAND-USE CHANGE AND FORESTRY (Jim Penman et al. eds., 2003), *available at* http://www.picc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm [hereinafter GOOD PRACTICE GUIDANCE FOR LULUCF].
[305] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, DEFINITIONS AND METHODOLOGICAL OPTIONS TO INVENTORY EMISSIONS FROM DIRECT HUMAN-INDUCED DEGRADATION OF FORESTS AND DEVEGETATION OF OTHER VEGETATION TYPES (Jim Penman et al. eds., 2003, *available at* http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/degradation.htm.
[306] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 16/CMP.1 Annex, ¶ 17, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].
[307] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 3(7), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol] (establishing the first commitment period from 2008-2012, within which Annex I Parties will have to meet their quantified limitation and reduction objectives set forth in Annex B to the Kyoto Protocol).
[308] Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 16/CMP.1 Annex, ¶ 17, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].
[309] *See id.*
[310] *See id.*
[311] *See id.* ¶ 6.
[312] *See id.* ¶ 17.
[313] *See id.* ¶ 7.

that the chosen activities have occurred since 1990 and are human-induced.[314] On the other hand, whenever verifiable human-induced changes in land use and forestry result in a net emission of greenhouse gas, an Annex I Party's assigned amount is decreased.[315]

Greenhouse gas estimates of anthropogenic emissions by sources and removals by sinks are based on the annual national inventories and communications mandated by the UNFCCC[316] and the national estimation systems the Kyoto Protocol requires of Annex I Parties.[317] The information provided is used to establish assigned amounts.[318] Limitations, measured in metric tons of CO_2 per year, are imposed on the augmentation and diminution of each Annex I Party's assigned amount for domestic LULUCF activities.[319]

ii. Accounting for Forestry Activities under Project-Based Flexibility Mechanisms under the Kyoto Protocol

Annex I Parties can claim credits against their assigned amounts for forestry project activities implemented jointly with another Annex I Party (joint implementation)[320] or with a non-Annex I Party (CDM).[321] The origin of joint projects

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[314] *See id.* ¶ 8.
[315] *See id.* ¶ 17; *see also* G. CORNELIS VAN KOOTEN, CLIMATE CHANGE ECONOMICS: WHY INTERNATIONAL ACCORDS FAIL 74 (2004) ("Afforestation and reforestation result in a credit, while deforestation (human-induced conversion of forestland to non-forest use) results in a debit. Since most countries have not embarked on large scale afforestation and/or reforestation projects in the past decade, harvesting trees during the five-year commitment period (2008-12) will cause them to have a debit on the ARD account . . . . If there is no ARD debit, then a country cannot claim the credit.")
[316] *See* Anita M. Halvorssen, *The Kyoto Protocol and Developing Countries – The Clean Development Mechanism,* 16 COLO. J. INT'L ENVTL. L. & POL'Y 353, 360 (2005) ("[T]he UNFCCC required all Parties to develop inventories of anthropogenic emissions and measures to mitigate climate change. Furthermore, the UNFCCC also obligated all Parties to produce a report on action taken to implement the UNFCCC, called 'national communications.' To fulfill their reporting obligations, Annex I Parties were given six months from the entry into force of the UNFCCC to submit their reports, while non-Annex I Parties (developing countries) were given three years and the least developed States were not given a deadline.").
[317] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 5(1), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].
[318] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 16/CMP.1 Annex, ¶ 20, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].
[319] *See id.* Decision 16/CMP.1 Appendix.
[320] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 6, Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].
[321] *See id.* art. 12.

can be traced back to the text of the UNFCCC,[322] which contemplates the possibility of Annex I Parties implementing policies and measures jointly.[323]

On the road to Kyoto, and during the negotiations of the Kyoto Protocol at COP-3, flexibility was a highly contentious issue among the Parties. The JUSSCANNZ countries[324] envisioned the opportunity to invest in projects abroad as a cheap way to mitigate their commitments (especially those related to forest and forestry activities)[325] and as the only feasible way to achieve them without hurting their economies. Part of the G-77[326] (plus China) and the European Union ("EU") saw it as a loophole. Some developing countries referred to joint implementation as "eco-colonialism."[327] Opponents saw forest and forestry projects abroad as allowing Annex I countries to invest in developing countries without having to take stronger domestic mitigation measures.[328]

The controversy has become moot due to COP-7's express embracement of forestry activities.[329] The conflicts were partially resolved by the parties' agreement to

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[322] *See* Mark C. Trexler & Laura H. Kosloff, *The 1997 Kyoto Protocol: What Does it Mean For Project-Based Climate Change Mitigation?*, 3 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CLIMATE CHANGE 1, 2-3 (1998).

[323] *See* United Nations Framework Convention on Climate Change, art. 4(2)(a), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC] ("These [Annex I Parties] may implement such policies and measures [limiting anthropogenic greenhouse gas emissions] jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention and, in particular, that of this subparagraph.").

[324] The JUSSCANNZ parties – Japan, the United States, Switzerland, Canada, Australia, Norway, and New Zealand – are a group of countries that tended to counterbalance the EU on the one hand and the G-77 on the other, although Norway, and Switzerland in particular, frequently stood somewhat apart from JUSSCANNZ positions. *See* MICHAEL GRUBB ET AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT xxxi (1999).

[325] *See* XVIII Session of the Intergovernmental Panel on Climate Change, Wembley, U.K.., Sept. 24-29, 2001, *Summary for Policymakers to Climate Change 2001: Synthesis Report of the IPCC Third Assessment Report*, at 15 (Oct. 1, 2001) [hereinafter *Synthesis Report of the IPCC Third Assessment Report*] ("Costs estimates reported to date for biological mitigation vary significantly from US$0.1 to about US$20 per t C in several tropical countries and from US$20 to US$100 per t C in non-tropical countries.").

[326] The G-77 is a large coalition representing the interests of developing countries. *See* Michael Richards, A Review of the Effectiveness of Developing Country Participation in the Climate Change Convention Negotiations 15 (December 2001) (unpublished working paper), *available at* http://www.odi.org.uk/iedg/participation_in_negotiations/climate_change.pdf. Since it is composed of countries that are also, in some cases, members of organizations such as Organization of Petroleum Exporting Countries ("OPEC") and Alliance of Small Island States ("AOSIS"), the G-77 represents countries that have very different interests. *See id.*

[327] *See* Pedro Moura-Costa & Marc D. Stuart, *Forestry-Based Greenhouse Gas Mitigation: A Short Story of Market Evolution*, 77 COMMONWEALTH FORESTRY REV. 196-97 (1998).

[328] *See* MICHAEL GRUBB ET AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT 87 (1999) ("The eligibility of land use, land-use change and forestry project activities under Article 12 is limited to afforestation and reforestation.").

[329] *See* Conference of the Parties to the Kyoto Protocol, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the Conference of the Parties*

limit forestry activities to afforestation and reforestation projects;[330] exclude nuclear activities; and require that project-based activities be supplemental to domestic measures and policies.[331]

4. Forest and Forestry Activities Under the CDM: The Legal and Institutional Frameworks

After since the controversy whether forestry project-activities should be included in the CDM was resolved by COP-7, a comprehensive legal and institutional framework was designed. This section examines this legal and institutional framework regarding forest and forestry activities under the CDM and considers how they were influenced by the conflicting interests surrounding them; the evolution of scientific and technological knowledge; and the experiences had during the AIJ Pilot Phase.

a. The Evolution of the Legal Framework

The legal framework for forest and forestry activities under the CDM is a product of a broader regulatory regime for joint implementation flexibility mechanisms. Articles 4(2)(a), 4(2)(b), 4(2)(d), and 3(3) of the UNFCCC are the main pillars of the joint implementation regulatory regime.[332] The first action in this regard was taken in 1995 at COP-1, when the parties agreed upon the AIJ Pilot Phase.[333] Shortly after, the Kyoto Protocol not only embraced the concept of joint implementation among Annex I Parties,[334] but extended it to non-Annex I countries through the CDM.[335]

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at its Ninth Session, Decision 19/CP.9, U.N. DOC FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].

[330] *See* Jason Schwartz, Note, *"Whose Woods These Are I Think I Know": How Kyoto May Change Who Controls Biodiversity*, 14 N.Y.U. ENVTL. L.J. 421, 457 (2006) (suggesting that the EU accepted the inclusion of forestry in the CDM as a tradeoff for the exclusion of nuclear power projects).

[331] *See* Conference of the Parties to the Kyoto Protocol, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the Conference of the Parties at its Ninth Session*, Decision 19/CP.9, U.N. DOC FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].

[332] *See* Naoki Matsuo, *CDM in the Kyoto Negotiations: How CDM Has Worked as a Bridge Between Developed and Developing Worlds?*, 8 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 191, 192 (2003).

[333] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Berlin, F.R.G., Mar. 28 – Apr. 7, 1995, *Report of the Conference of the Parties on its First Session – Part Two: Action Taken by the Conference of the Parties at its First Session*, Decision 5/CP.1, ¶ 1(a), U.N. DOC FCCC/CP/1995/7/Add.1 (June 6, 1995) [hereinafter *COP-1 Report – Part Two*].

[334] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 6, Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

i. The AIJ Pilot Phase

The UNFCCC's broad provisions authorizing joint implementation of policies and measures[336] were made operational through the AIJ Pilot Phase. Decision 5/CP.1 of COP-1 in 1995 expressly recognized Article 4(2)(d)'s mandate, imposing upon the Conference of the Parties the duty to regulate joint implementation of policies and measures aimed at curbing anthropogenic emission of greenhouse gases. To accommodate developing countries' concerns, activities undertaken pursuant to the AIJ Pilot Phase did not provide credits against developed countries' assigned amounts, which at that time had not yet been agreed upon. The AIJ Pilot Phase was voluntary in nature.

Moreover, the AIJ Pilot Phase embraced non-Annex I countries' participation through the hosting of project-based activities. This experimental period also covered, at least generically, all relevant sources, sinks, and reservoirs of greenhouse gases, which allowed for the ample use of forest and forestry activities. The fact is that "[t]he importance of information, training, appropriate capacity and institutions for the development of CDM projects is underlined by experience from the [AIJ Pilot Phase]."[337] The idea was to engage different stakeholder's participation in this then new concept of a market-base policy instrument and teach them through practical experience.

The AIJ Pilot Phase yielded information regarding geographical trends and potential social and environmental benefits related to forest and forestry activities, which provided substantial background for future negotiations.[338] These elements were all crucial during the discussions over flexibility mechanisms at COP-3 and beyond,

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[335] *See id.* art. 12.

[336] *See* United Nations Framework Convention on Climate Change, arts. 3(3), 4(2)(a), 4(2)(b), 4(2)(d), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[337] *See* Alex Michaelowa, *CDM Host Country Institution Building,* 8 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 201, 202 (2003).

[338] *See* Eleventh Session of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Activities Implemented Jointly Under the Pilot Phase: Issues to be Addressed in the Review of the Pilot Phase, Including the Third Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶¶ 6-21, U.N. DOC FCCC/SB/1999/5 (Sept. 15, 1999) [hereinafter *1999 SBSTA & SBI Report*] (presenting data on geographical distribution of projects, environmental, and socio-economic impacts).

when negotiators faced conflicting pressures on the issue of whether to include forest and forestry activities in the CDM.[339]

1. A Panorama of the Main Reports Regarding the AIJ Pilot Phase and its Positive Outcomes

Through the reporting requirements of the AIJ Pilot Phase, the SBSTA was able to produce annual synthesis reports before recommending a comprehensive review of the AIJ Pilot Phase, which was completed and sent to the fifth session of the Conference of the Parties ("COP-5") in 1999.[340] Specifically, with regard to forest and forestry activities, those annual synthesis reports[341] and the final review of the AIJ Pilot Phase[342] provided useful data on important geographical trends, technical challenges (monitoring and reporting); social and environmental benefits and impacts; possible global benefits (in comparison with other types of activities); and effects on national economies (helping developing countries achieve sustainable development and developed countries achieve their commitments under the climate change regime).[343] The figures below, excerpted from the SBSTA synthesis reports on the AIJ Pilot Phase, illustrate some of what was learned about the above-mentioned issues during this experimental period.

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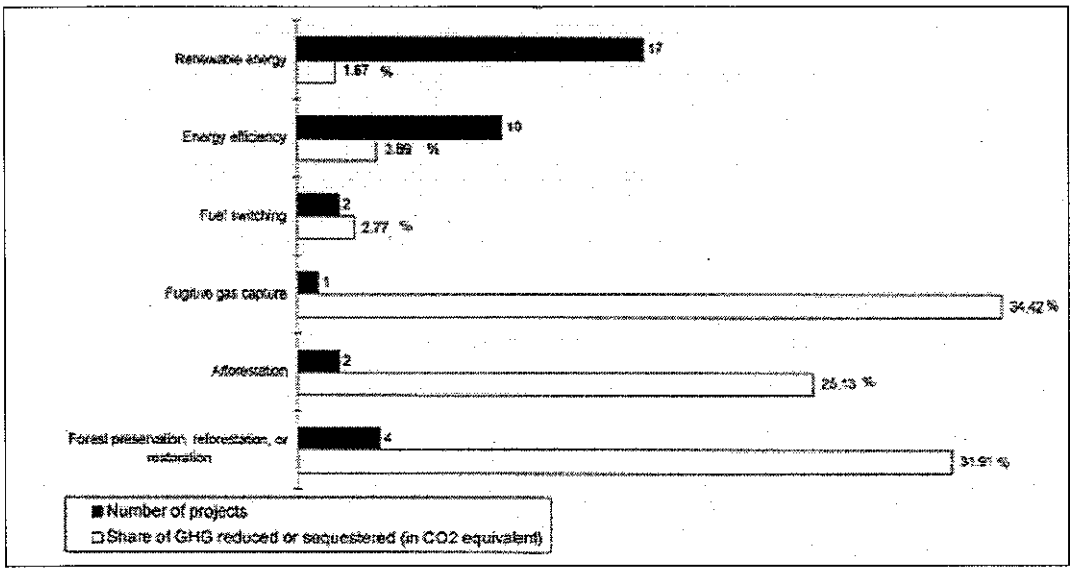
[339] *See id.* ¶¶ 17-19 (providing an "[a]ssessment of environmental benefits related to the mitigation of climate change that would not have occurred in the absence of [Activities Implemented Jointly ("AIJ")], covering all relevant sources, sinks and reservoirs of greenhouse gases and the methods used to measure, monitor and independently verify these emissions, including by type of project, and other environmental benefits.").

[340] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Report of the Conference of the Parties on its Fifth Session – Part Two: Action Taken by the Conference of the Parties at its Fifth Session*, Decision 13/CP.5, pmbl., U.N. DOC FCCC/CP/1999/6/Add.1 (Feb. 2, 2000) (taking note of the SBSTA and SBI's comprehensive review of the AIJ pilot phase and third synthesis report on activities implemented jointly).

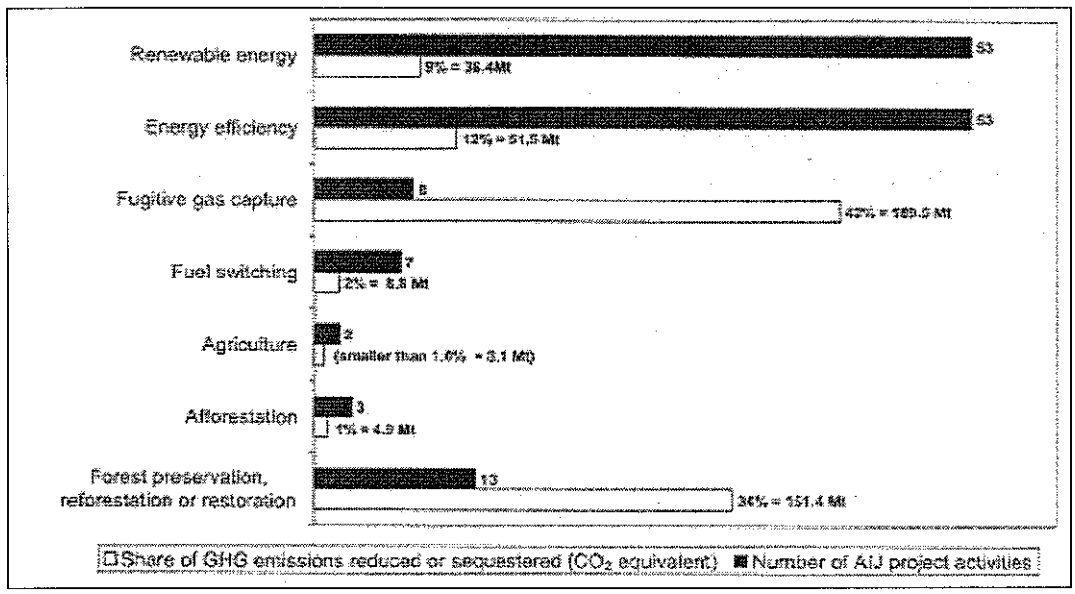
[341] *See, e.g.*, *See* Eleventh Session of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Activities Implemented Jointly Under the Pilot Phase: Issues to be Addressed in the Review of the Pilot Phase, Including the Third Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶¶ 36-39, U.N. DOC FCCC/SB/1999/5 (Sept. 15, 1999) [hereinafter *1999 SBSTA & SBI Report*].

[342] *See id.* ¶¶ 5-35.

[343] *See id.* ¶¶ 5-69.



Source: *1997 SBSTA Report.*[344]



Source: *2001 SBSTA Report.*[345]

[344] Seventh Session of the Subsidiary Body for Scientific and Technological Advice, Bonn, F.R.G., October 20-29, 1997, *Activities Implemented Jointly Under the Pilot Phase: Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 18 fig. 1, U.N. DOC FCCC/SBSTA/1997/12 (Oct. 7, 1997) [hereinafter *1997 SBSTA Report*].

[345] Fifteenth Session of the Subsidiary Body for Scientific and Technological Advice, Marrakesh, Morocco, Oct. 29-Nov. 9, 2001, *Activities Implemented Jointly Under the Pilot Phase: Fifth Synthesis Report on Activities Implemented Jointly Under the Pilot Phase – Note by the Secretariat*, Annex fig. 4, U.N. DOC FCCC/SBSTA/2001/7 (Sept. 12, 2001) [hereinafter *2001 SBSTA Report*].

Figure 1 shows that while forest conservation and forestry activities represented only six of the thirty-nine projects in 1997 (roughly fifteen percent of the total), they accounted for fifty-seven percent of the final mitigation impact. Figure 2 shows that although they represented fifteen of the 139 projects (roughly ten percent of the total), forest conservation and forestry activities accounted for thirty-five percent of the abatement impact in 2001. The data demonstrates that although they represent a smaller portion of the total number of projects, the CO2 storage and sequestration potentials of forest and forestry activities is significantly higher in comparison with other types of projects.

In its first synthesis report, the SBSTA highlighted that "most data on the costs and the amount of [greenhouse gases] abated are only estimates and are, therefore, no a suitable basis for analysis."[346] When the report was released, the Parties were in the final preparation for the Kyoto negotiation process. The IPCC had not yet published its special report on LULUCF, which occurred in 2000.[347] The first specific decision on forestry activities in the CDM was only agreed upon in 2003, at COP-9,[348] the same year in which the IPCC's report on good practice guidance for LULUCF was release.[349] This sequence of events explains the correlation between the growing consensus on the challenges of forest and forestry project activities and their decrease (with respect to other types of projects considered much simpler) in terms of quantity of projects and share of greenhouse gas abatement impact.

As to the geographical distribution of forest conservation and forestry projects and their environmental and socio-economic impacts, the 1999 subsidiary bodies' report on the issues to be addressed in the review of the AIJ Pilot Phase proved a useful source of information for a more comprehensive assessment of the AIJ Pilot Phase. With regard to the socio-economic aspects of projects undertaken during the AIJ Pilot Phase,

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[346] *See* Seventh Session of the Subsidiary Body for Scientific and Technological Advice, Bonn, F.R.G., October 20-29, 1997, *Activities Implemented Jointly Under the Pilot Phase: Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 6(c), U.N. DOC FCCC/SBSTA/1997/12 (Oct. 7, 1997) [hereinafter *1997 SBSTA Report*].

[347] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF]

[348] *See* Conference of the Parties to the Kyoto Protocol, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the Conference of the Parties at its Ninth Session,* Decision 19/CP.9, U.N. DOC. FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].

[349] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, GOOD PRACTICE GUIDANCE FOR LAND-USE, LAND-USE CHANGE AND FORESTRY (Jim Penman et al. eds., 2003), *available at* http://www.picc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm [hereinafter GOOD PRACTICE GUIDANCE FOR LULUCF].

the subsidiary bodies verified an increase in capacity-building through enhancement of procedural and institutional experience, and the Parties reported "active involvement of local communities, increased public awareness, and the maintenance of natural heritage and historical sites."[350] Interestingly, recent debates on a post-2012 market-based forestry instrument are around assuring equitable access to low-income and traditional communities to the benefits generated from carbon forest credits.[351]

The report also highlighted how host Parties, mostly developing countries, were able to attract financial resources and direct them towards national development goals. Despite the subsidiary bodies' statement that socio-economic and environmental factors were not sufficiently addressed, particularly with respect to forest and forestry activities, the parties reported " fostering biodiversity, improving water and air quality and reducing erosion of hydrological resources" as environmental benefits.[352]

In the AIJ Pilot Phase review report, some Parties linked their development goals to forestry and land-use.[353] Indeed, Figure 3 demonstrates that those Parties, although not identified in the report, are most likely developing countries in Latin America. Figure 3 shows that most of the forest preservation and reforestation projects - and roughly half of the afforestation activities - were taking place in Latin America and the Caribbean region. This is not surprising given that a large percentage of the remaining tropical forests in the word are concentrated in Latin America.[354]

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[350] *See* Eleventh Session of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Activities Implemented Jointly Under the Pilot Phase: Issues to be Addressed in the Review of the Pilot Phase, Including the Third Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 57, U.N. DOC FCCC/SB/1999/5 (Sept. 15, 1999) [hereinafter *1999 SBSTA & SBI Report*].

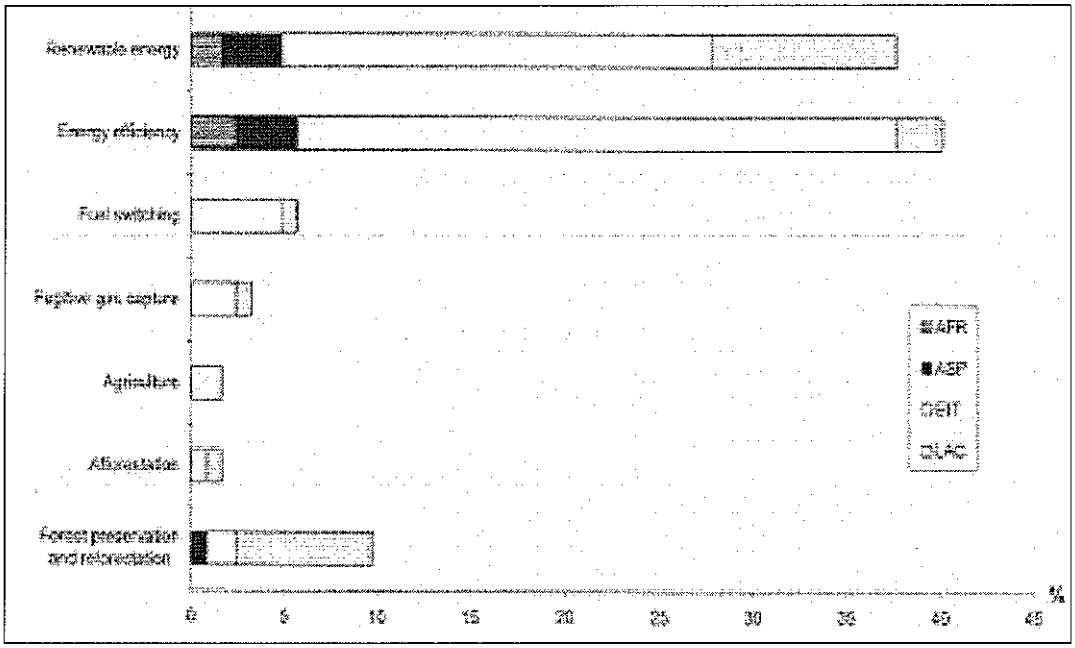
[351] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 25 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (" The difficulties of ensuring equitable benefits in market transactions stem from the fact that many of the poorest lack property rights, and concern exists that as new economic opportunities are introduced for forest resources, the poor may be unable to retain access to or control over them. Another concern is that transaction costs will exclude the poorest of the poor from participating in emerging opportunities. Some project-based evidence shows that these factors can be an issue and that regulatory measures may be required to ensure equitable access to markets.").

[352] *See* Eleventh Session of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Activities Implemented Jointly Under the Pilot Phase: Issues to be Addressed in the Review of the Pilot Phase, Including the Third Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 57, U.N. DOC FCCC/SB/1999/5 (Sept. 15, 1999) [hereinafter *1999 SBSTA & SBI Report*].

[353] *See id.* ¶ 15.

[354] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment 2005: Progress Towards Sustainable Forest Management*, 15 (FAO Forestry Paper 147, 2006), *available at* ftp://fao.org./docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resources Assessment 2005*].

One can get a better sense of the region's potential for these types of projects by noting that the data presented does not include information regarding Brazil,[355] which contains a considerable portion of the world's remaining tropical forests.[356] In addition to the resources availability element, the costs of forest and forestry greenhouse gas abatement practices are considerably lower in developing countries,[357] which contributed to Latin America's share of the market in hosting preservation, reforestation, and afforestation project activities.



Source: *1999 SBSTA & SBI Report* (AFR: Africa; ASP: Asia and Pacific Region; EIT: Economies in Transition; LAC: Latin America and Caribbean).[358]

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[355] *See* Eleventh Session of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Activities Implemented Jointly Under the Pilot Phase: Issues to be Addressed in the Review of the Pilot Phase, Including the Third Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 44 n.21, U.N. DOC FCCC/SB/1999/5 (Sept. 15, 1999) [hereinafter *1999 SBSTA & SBI Report*] (listing Belize, Bolivia, Costa Rica, Ecuador, Honduras, Guatemala, Mexico, Nicaragua, and Panama as hosting projects in Latin America).

[356] *See* Food and Agriculture Org. of the U.N. [FAO], *Global Forest Resources Assessment 2005: Progress Towards Sustainable Forest Management*, 15 (FAO Forestry Paper 147, 2006), *available at* ftp://fao.org./docrep/fao/008/A0400E/A0400E00.pdf [hereinafter *Global Forest Resources Assessment 2005*].

[357] *See* XVIII Session of the Intergovernmental Panel on Climate Change, Wembley, U.K.., Sept. 24-29, 2001, *Summary for Policymakers to Climate Change 2001: Synthesis Report of the IPCC Third Assessment Report*, at 15 (Oct. 1, 2001) [hereinafter *Synthesis Report of the IPCC Third Assessment Report*].

[358] *See* Eleventh Session of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Activities Implemented Jointly*

2. The Main Challenges Encountered During the AIJ Pilot Phase

The AIJ Pilot Phase review report summarized the major problems encountered by the Parties during the implementation of activities. Highlighting common problems during the AIJ Pilot Phase was a useful tool for improving the flexibility mechanisms of the Kyoto Protocol, particularly with respect to the CDM.[359] The following are some of the general obstacles encountered during all types of projects under the AIJ Pilot Phase:

> (a) Differences in the investment climate; (b) cultural differences; (c) insufficient infrastructure; (d) institutional capacity; (e) relative absence of investment companies; (f) lack of policy on AIJ and of a clear and transparent set of operational rules on the part of the host country; (g) lack of awareness in the private sector in host countries on opportunities represented by AIJ; (h)variations in the degree of knowledge and acceptance of AIJ by local stakeholders; (i) lack of capacity to produce comprehensive AIJ project proposals; (j) existing preferences, driven by established business partnerships, strategic considerations and political priorities for investors for particular areas; (k) differences in [greenhouse gas] reduction costs and in transaction costs due to, *inter alia*, some of the above points; and (l) current exclusion of crediting for [greenhouse gas] reductions or removals by sinks.[360]

Other general obstacles included " high transaction costs"[361] and "the uncertainty regarding two major interlinked methodological issues, the identification of the project baseline and additionality."[362] Note worthy that these two obstacles remain

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Under the Pilot Phase: Issues to be Addressed in the Review of the Pilot Phase, Including the Third Synthesis Report on Activities Implemented Jointly – Note by the Secretariat, ¶ 45 fig.3, U.N. DOC FCCC/SB/1999/5 (Sept. 15, 1999) [hereinafter *1999 SBSTA & SBI Report*].

[359] *See* Alex Michaelowa, *CDM Host Country Institution Building*, 8 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 201, 202 (2003).

[360] *See* Eleventh Session of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, Bonn, F.R.G., Oct. 25-Nov. 5, 1999, *Activities Implemented Jointly Under the Pilot Phase: Issues to be Addressed in the Review of the Pilot Phase, Including the Third Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 8, U.N. DOC FCCC/SB/1999/5 (Sept. 15, 1999) [hereinafter *1999 SBSTA & SBI Report*].

[361] *See id.* ¶ 22.

[362] *See id.*

current in the debate for a post-2012 Kyoto legal regime. The regulatory forestry market was not able to learn with experiences learned during the AIJ Pilot Phase and high transaction costs and strict regulations are often cited as the downside of the regulatory market in comparison with voluntary markets.[363]

Finally, the AIJ Pilot Phase was characterized by a lack of strong oversight, which can be traced to a weak regulatory regime. Therefore, even though the data presented were useful to negotiators in developing the regulatory framework for afforestation and reforestation practices in the CDM, and helpful in indicating trends and potentials, the results lacked accuracy. Nonetheless, the AIJ Pilot Phase was crucial in that it called attention to the technical, scientific, and socio-economic challenges related to forest and forestry activities, which inevitably represented one of the most important factors in the development of a stronger and tighter regulatory regime aimed at dealing with forest and forestry activities in the CDM.[364]

ii. The CDM of the Kyoto Protocol

After the COP-3 negotiations, project-based joint implementation under the UNFCCC ended up, via the Kyoto Protocol, divided into joint implementation and the CDM. The CDM's purpose was construed to serving as the means to assist on the UNFCCC's goal of "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[365] This market-based policy instrument was just one piece within a larger legal framework designed to meeting the aforementioned UNFCCC's main objective.

It was then that the final language of Article 12 of the Kyoto Protocol (which addressed the CDM) provided the CDM with a threefold objective:[366] (1) assist non-

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[363] RICARDO BAYON, AMANDA HAWN AND KATHERINE HAMILTON, VOLUNTARY CARBON MARKETS – AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 13 (Earthscan 2007) (2007) ("The innovation, flexibility and lower transaction costs of the voluntary carbon market can benefit buyers as well as suppliers . . . . some sellers and buyers of carbon credits prefer the voluntary carbon market precisely because it does not depend on regulation.").

[364] *See generally* Pedro Moura-Costa & Marc D. Stuart, *Forestry-Based Greenhouse Gas Mitigation: A Short Story of Market Evolution*, 77 COMMONWEALTH FORESTRY REV. 5-7 (1998) (following the development of AIJ programs through the difficult early pahses to the eventual creation of the CDM).

[364] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 3(4), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol]

[365] United Nations Framework Convention on Climate Change, art. 2, May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[366] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 12 (2), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

Annex I Parties in achieving sustainable development; (2) contribute to the UNFCCC's overall objective; and (3) help developed countries achieve their quantified emissions limitation and reduction commitments.[367] However, the negotiations resulting in such economic policy instrument was controversial and divided the international community up until the 1997 Kyoto Protocol and afterwards. How consensus was reached is further examined in the following sections.

1. The Controversy Regarding Whether Forests and Forestry Activities Were Meant to be Included in the CDM

Prior to the negotiations at COP-3, the Parties had before them the 1997 SBSTA synthesis report on the AIJ Pilot Phase.[368] This report, which was noted in Decision 10/CP.3 of COP-3,[369] indicated the existence of six ongoing forestry preservation and afforestation activities and the ample participation of developing countries as project hosts.[370] It served to consolidate the learning phase prior to a final decision on economic policy incentives in the Kyoto Protocol

Opponents of the inclusion of sinks in the CDM[371] argued that Article 12 did not provide legal support for such inclusion. They argued that while Article 6 (regarding joint implementation) clearly mentions sinks, Article 12 does not. In addition, the opposition argued that because sink projects could not be accurately measured, they did

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[367] *See id.*

[368] *See* Seventh Session of the Subsidiary Body for Scientific and Technological Advice, Bonn, F.R.G., October 20-29, 1997, *Activities Implemented Jointly Under the Pilot Phase: Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, U.N. DOC FCCC/SBSTA/1997/12 (Oct. 7, 1997) [hereinafter *1997 SBSTA Report*].

[369] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Japan, Dec. 1-11, 1997, *Report of the Conference of the Parties on its Third Session – Part Two: Action Taken by the Conference of the Parties at its Third Session,* Decision 10/CP.3, pmbl., U.N. DOC FCCC/CP/1997/7/Add.1 (Mar. 25, 1998).

[370] *See* Seventh Session of the Subsidiary Body for Scientific and Technological Advice, Bonn, F.R.G., October 20-29, 1997, *Activities Implemented Jointly Under the Pilot Phase: Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 6, U.N. DOC FCCC/SBSTA/1997/12 (Oct. 7, 1997) [hereinafter *1997 SBSTA Report*].

[371] The EU was the main opponent of the inclusion of forestry in the CDM, while the Umbrella Group (United States, Japan, Canada, Australia, New Zealand, and Iceland) was the main proponent. *See* Pedro Moura-Costa, Carbon Trading and Investment in Clean Energy Products 4 (2001) (unpublished manuscript), *available at* http://www.ecosecurities.com/Assets/3157/Pubs_Carbon%20trading%20and%20investiment%20in%20clean%20energy%20projects.pdf.

not meet Article 12(5)(b)'s requirement that certification under the CDM be on the basis of "[r]eal, measurable, and long-term benefits related to the mitigation of climate change . . . .".[372] Difficulties on effective measurement of carbon offset from forestry projects was thus claimed as not meeting the "real measurable" requirement set forth Article 12(5)(b) of the Kyoto Protocol.

Indeed, whereas Article 6 refers expressly to projects providing enhancement of removals by sinks, Article 12 addresses project activities generally and without further specification.[373] However, a closer analysis shows that the climate change regime did not provide for the exclusion of sink projects in the CDM.[374] First, the CDM originated in the UNFCCC's joint implementation provisions, and under the AIJ Pilot Phase, Annex I and non-Annex I Parties utilized forest and forestry activities amply. Second, Article 12 does not identify any specific type of project, such as renewable energy or energy efficiency.[375] It is limited to setting forth the CDM's objectives[376] and general information regarding the CDM's operation.[377] The omission, then, represents a mere inaccuracy in the Kyoto Protocol's written language. Moreover, contrary to the position of those subscribing to the impossibility of measuring and monitoring forestry projects, currently approved monitoring methodologies by the CDM's Executive Board demonstrate that forestry activities can be monitored and measured, albeit with more difficulty.

Common ground was possible, at least in part, because of the leverage exerted by countries pushing for the inclusion of forestry activities (the Umbrella Group),[378] particularly the United States, Japan, Canada, and Australia,[379] and a portion of the G-

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[372] *See* MICHAEL GRUBB ET AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT 241 (1999).
[373] *Compare* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 6 (1), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol] (referring specifically to enhancement of removals by sinks of greenhouse gases), *with* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 12 (5), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol] (referring to "emission reductions" generally).
[374] *See* DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 645 (2d ed. 2002) ("Both the Framework Convention and the Kyoto Protocol clearly contemplate that sinks such as forests would be within the ambit of the climate regime.").
[375] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 12(5), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol] (referring to "emission reductions" generally).
[376] *See, e.g.*, *id.* art. 12(2) (stating that one of the CDM's purposes is to assist Parties not included in Annex I in achieving sustainable development).
[377] *See, e.g.*, *id.* art. 12(4) (subjecting the CDM to the control of the Conference of the Parties serving as the Meeting of the Parties and the supervision of an executive board).
[378] *See A Brief Analysis of COP-6 Part II*, EARTH NEGOTIATIONS BULL., Jul. 30, 2001, at 13, *available at* http://www.iisd.ca/download/pdf/enb12176e.pdf.
[379] *See* Jason Schwartz, Note, *"Whose Woods These Are I Think I Know": How Kyoto May Change Who Controls Biodiversity*, 14 N.Y.U. ENVTL. L.J. 421, 456 (2006).

77 and China.[380] Considering that the United States and other Umbrella Group countries account for over half of the world's emissions, their engagement was crucial to the Kyoto Protocol's success. Another important aspect was the EU's refusal to accept the inclusion of nuclear projects in the CDM. In order to avoid any attempt by the United States, or China and India, to push the debate on the inclusion of nuclear energy projects forward, the EU showed some flexibility and ended up accepting forestry activities in the CDM.[381] The controversy was finally settled at COP-7, where negotiators agreed to include forestry in the CDM but limited it to afforestation and reforestation activities.[382]

2. The Seventh, Ninth and Tenth Sessions of the Conference of the Parties

Although no consensus was reached at the sixth session of the Conference of the Parties ("COP-6") and COP-6 "bis" on the issue of LULUCF generally,[383] progress made during those two meetings allowed for the inclusion of forestry activities in the CDM at COP-7 in Marrakesh in 2001. The outcome of this meeting was called the "Marrakesh Accords."[384] Through the annex to the decision on LULUCF, the Parties finally agreed on the inclusion of forestry projects in the CDM. Their inclusion, however, was limited in the following ways: (1) forestry in the CDM was limited to afforestation and reforestation activities;[385] (2) total additions to a Party's assigned

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[380] Manuel Estrada Porrua and Andrea García-Guerrero, *A Latin American Perspective on Land Use, Land-Use Change, and Forestry Negotiations under the United Nations Framework Convention on Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 209, 211 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008). ("The inclusion of sinks was also supported to some extent by Brazil, Peru, and Argentina, but many other G77 countries, such as those included in the Alliance of Small Island States (AOSIS), China, and India, opposed it.").

[381] *See id.* at 457.

[382] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶ 2(e), U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

[383] *See A Brief Analysis of COP-6 Part II*, EARTH NEGOTIATIONS BULL., Jul. 30, 2001, at 13, *available at* http://www.iisd.ca/download/pdf/enb12176e.pdf ("The collapse of The Hague negotiations was attributed by many observers to disagreement over LULUCF issues: 'It was sinks that sunk The Hague.' ").

[384] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶ 1, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

[385] *See id.* ¶ 13(e).

amount were limited to one percent of base year emissions times five;[386] and (3) a regulatory regime for future commitment periods would be decided upon during the negotiations on the second commitment period.[387]

Broadly speaking, the EU's main interests prevailed over the Umbrella Group's main interests, at least for the first commitment period. The EU succeeded in banning nuclear projects in the CDM;[388] limiting forestry activities to afforestation and reforestation;[389] and limiting the amount accountable against an Annex I Party's assigned amount.[390] In practice, since the EU Emissions Trading Scheme ("ETS") excluded carbon credits originating from LULUCF activities,[391] and European countries (and their private entities) represent the vast majority of Annex I buyers (taking into account that the United States has not yet ratified the Kyoto Protocol),[392] the inclusion of forestry in the CDM did not significantly affect the EU's interests for the first commitment period. Still, the Umbrella Group did manage to insert sinks in the CDM and left open the debate for future commitment periods.

Once forestry made it into the CDM and the Parties had established flexibility for the future and general eligibility and offsetting limitations, and operational regulatory regime was needed. Despite no progress at the eighth session of the Conference of the Parties ("COP-8") in 2002, the Parties would agree upon a thorough regulatory regime for forestry in the CDM at the ninth session of the Conference of the parties ("COP-9") in 2003.[393] Decision 19/CP.9 set up modalities and procedures for afforestation and reforestation activities under the CDM.[394] Decision 19/CP.9 was also important because it affirmed the principles of Decision 11/CP.7 of COP-7 on

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[386] *See id.* Decision 11/CP.7 Annex, ¶ 14.
[387] *See id.* ¶ 15.
[388] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II)*, Decision 17/CP.7, pmbl., U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter *COP-7 Report – Part Two (Volume II)*].
[389] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I),* Decision 11/CP.7 Annex, ¶ 13, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].
[390] *See id.* ¶ 11.
[391] *See* Council Directive No. 2004/101/EC, art. 1, 2004 O.J. L. 338, at 18, 21.
[392] *See* United Nations Framework Convention on Climate Change, Annex I, May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].
[393] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the Conference of the Parties at its Ninth Session,* Decision 19/CP.9, U.N. DOC. FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].
[394] *See id.*

LULUCF[395] and enabled a more flexible regulatory regime for small-scale forestry projects in the CDM,[396] which would follow a model that the Parties had already implemented at COP-8 for CDM activities such as renewable energy and energy efficiency.[397]

The legal framework for forestry under the CDM in the first commitment period was completed when the Parties, at the tenth session of the Conference of the Parties ("COP-10") in 2004, agreed upon Decision 14/CP.10, which set forth simplified modalities and procedures for small-scale afforestation and reforestation activities under the CDM.[398] This regulatory regime was implemented at the first Meeting of the Parties in 2005, right after the Kyoto Protocol had entered into force.[399] Table 1 provides a chronological overview of general and specific legal provisions applicable to forestry project activities under the CDM.

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[395] *See id.* pmbl.
[396] *See id.* ¶¶ 3-6.
[397] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, New Delhi, India, Oct. 23-Nov. 1, 2002, *Report of the Conference of the Parties on its Eighth Session – Part Two: Action Taken by the Conference of the Parties at its Eighth Session*, Decision 21/CP.8 Annex II, U.N. DOC FCCC/CP/2002/7/Add.3 (Mar. 28, 2003).
[398] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Buenos Aires, Arg., Dec. 6-18, 2004, *Report of the Conference of the Parties on its Tenth Session – Part Two: Action Taken by the Conference of the Parties at its Tenth Session*, Decision 14/CP.10, U.N. DOC FCCC/CP/2004/10/Add.2 (Apr. 19, 2005).
[399] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part One: Proceedings*, ¶ 8, U.N. DOC FCCC/KP/CMP/2005/9 (Mar. 30, 2006) ("The President said that there had been many remarkable achievements on the path from Kyoto to Montreal, including the steadfast efforts by many countries to promote the ratification of the Protocol, the completion of the Marrakesh Accords, and the prompt start of the clean development mechanism. National efforts to implement the provisions of the Protocol were now well under way.").

Provision	Subject	Status	Adoption
Arts. 4.2(a)(b)(d) & 3.3 / UNFCCC	JI under the Convention	General	1992 UNFCCC
Dec. 5/CP.1	AIJ Pilot Phase	General	1995 COP-1
Arts. 3.3, 3.4 & 12 / Kyoto Protocol	LULUCF Activities & the CDM	General / Specific	1997 Kyoto Protocol
Decs. 7 & 9/ CP.4	CDM & LULUCF Work Programme	General	1998 COP-4
Decs. 11, 15 & 17/CP.7	LULUCF Activities & the CDM	Specific	2001 COP-7
Dec. 21/CP.8	CDM	Specific	2002 COP-8
Dec. 19/CP.9	A/R in the CDM	Specific	2003 COP-9
Decs. 13 & 14/ CP.10	Reporting A/R in the CDM & Simplified A/R Activities in the CDM	Specific	2004 COP-10
Decs. 2, 3, 4, 5, 6, 16 & 17/ CMP.1	Adopting draft decisions recommended by previous COPs	Specific / General	2005 MOP-1

iii. The Institutional Framework

The UNFCCC launched a comprehensive institutional framework for implementing measures and policies; developing guidelines and methodologies; and coordinating and translating scientific work into norms and decisions[400] aimed at achieving the UNFCCC's ultimate objective of stabilizing greenhouse gases

[400] *See* CLIMATE CHANGE SECRETARIAT, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE ("UNFCCC"), UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE HANDBOOK 27-43 (2006), *available at* http://unfccc.int/resource/docs/publications/handbook.pdf [hereinafter UNFCCC HANDBOOK].

concentrations in the atmosphere.[401] Accordingly, the institutions dealing with forestry in the CDM are the product of a broader framework, one that relies not only upon the supreme bodies of the UNFCCC and the Kyoto Protocol, but also upon more specific institutions unique to the control and management of afforestation and reforestation projects in the CDM. The following two sections break down the CDM's institutional framework with respect to forestry.

1. The Conference of the Parties and Meeting of the Parties

With primary decision-making power, the Conference of the Parties is the highest body in the institutional hierarchy and the organ from which the regulatory scheme emerges.[402] Therefore, the decisions on forestry in the CDM[403] derive their legal force from the powers conferred to the Conference of the Parties by the UNFCCC. The Kyoto Protocol set forth the CDM's specific institutional framework[404] and granted the Conference of the Parties the function of serving as the Meeting of the Parties to the Kyoto Protocol.[405]

2. The SBSTA and the CDM Executive Board

The SBSTA is the advisory body that links available scientific information to the climate change regime's decision-making process.[406] It is different from the IPCC and

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[401] *See* United Nations Framework Convention on Climate Change, art. 2, May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[402] *See* DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 233 (2d ed. 2002) ("Much like a corporate body of directors, the conferences of the parties ("CoPs") are the primary policy-making organs of most global environmental treaty regimes. The CoPs usually occur once every one or two years and conduct the major business of monitoring, updating, revising, and enforcing the conventions.").

[403] *See* United Nations Framework Convention on Climate Change, art. 7, May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[404] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 12, Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[405] *See id.* art 13(1).

[406] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Berlin, F.R.G., Mar. 28 – Apr. 7, 1995, *Report of the Conference of the Parties on its First Session – Part Two: Action Taken by the Conference of the Parties at its First Session*, Decision 6/CP.1, U.N. DOC FCCC/CP/1995/7/Add.1 (June 6, 1995) [hereinafter *COP-1 Report – Part Two*] (characterizing the SBSTA as "the link between the scientific, technical and technological assessments and the information provided by competent international bodies, and the policy-oriented needs of the Conference of the Parties.").

was not designed to replace it.[407] Article 15 of the Kyoto Protocol states that the subsidiary bodies created under the UNFCCC remain in charge of providing scientific and technological advice and assistance to the Conference of the Parties and the Meeting of the Parties.[408] The SBSTA takes into account the work of other international institutions, such as the IPCC; provides guidance on scientific, technical, and technological matters, and recommends decisions to the Conference of the Parties and the Meeting of the Parties.[409]

Another important organ in the CDM forestry institutional framework is the CDM Executive Board. Featured in Article 12(4) of the Kyoto Protocol, the Executive Board was created to oversee CDM activities under the guidance and authority of the Conference of the Parties and the Meeting of the Parties.[410] Through Decision 17/CP.7, the Conference of the Parties expanded the Executive Board's supervisory role by granting it decision-making power over the approval of designated operational entities ("DOEs");[411] the final work on new methodologies;[412] baseline and monitoring

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[407] *See* Michael Grubb, *The Outcome of the Berlin Conference, in* THE EMERGING INTERNATIONAL REGIME FOR CLIMATE CHANGE: STRUCTURES AND OPTIONS AFTER BERLIN 2.

[408] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 15(1), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[409] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I),* Decision 11/CP.7 Annex, ¶ 2, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*] The SBSTA's eighth session report is good example of its work. In this report, the SBSTA offered an interpretation of Article 3.3 of the Kyoto Protocol; requested that the IPCC prepare a report regarding LULUCF; invited the Parties to submit data relating to the implementation of Article 3.3 of the Kyoto Protocol and modalities, rules, and guidelines regarding additional human-induced activities under Article 3.4 of the Kyoto Protocol; called for a workshop of experts; and requested that the secretariat liaise with the secretariat of the Convention on Biological Diversity, the secretariat of the Convention to Combat Desertification, the International Forum on Forests, the FAO, and any other international organizations that might have relevant information. *See* Eighth Session of the Subsidiary Body for Scientific and Technological Advice, Bonn, F.R.G., June 2-12, 1998, *Report of the Subsidiary Body for Scientific and Technological Advice on its Eighth Session,* ¶ 45, U.N. DOC FCCC/SBSTA/1998/6 (Aug. 12, 1998), *available at* http://unfccc.int/resource/docs/1998/sbsta/06.pdf.

[410] *See* Conference of the Parties to the United Nations Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II),* Decision 17/CP.7 Annex, ¶ 5, U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume II)*].

[411] *See id.* ¶ 5(f); Wolfram Kägi & Dieter Schöne, *Forestry Projects Under the CDM: Procedures, Experiences and Lessons Learned* 9 (U.N. Food and Agriculture Organization, Forests and Climate Change Working Paper No. 3, 2005) ("DOEs are accredited by the Executive Board and perform two functions: validating CDM projects, and verifying and certifying emissions reductions from projects. A designated operational entity shall not perform validation or verification and certification on the same CDM [afforestation/reforestation] project activity.").

[412] *See* Conference of the Parties to the United Nations Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II),* Decision 17/CP.7 Annex, ¶ 5(d), U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume II)*].

methodologies;[413] and issuance of certified emission reductions ("CERs").[414] In sum, the Executive Board is the administrative body in charge of handling projects undertaken pursuant to the CDM and all related matters.[415]

3. DOEs and the Afforestation and Reforestation Working Group

The CDM Executive Board can accredit DOEs and recommend them to the Conference of the Parties and Meeting of the Parties for final designation.[416] The idea behind DOEs is to preserve the Executive Board's oversight and decision-making role over proposed new methodologies while delegating validation, verification, and certification processes to a specialized outside corporation that is presumably more efficient at accomplishing the tasks.[417] If the Executive Board had to operate the technical field work associated with validation, verification, and certification for each proposed project, the financial and human resources necessary would make the process unfeasible.[418]

In addition, by working with different and independent DOEs in the validation, verification, and certification stages, the Executive Board's institutional framework is constantly being crosschecked, diminishing the likelihood of imprecise certified emissions reductions ("CERs") which translates into carbon credits. This third-party audit scheme is particularly important in light of how non-Annex I countries do not have emissions limitation commitments.[419] The downside is that such a comprehensive process adds bureaucracy and complexity, requiring a high level of multidisciplinary expertise. This, in turn, reduces participation by developing countries' stakeholders,

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[413] *See id.*
[414] *See id.* ¶¶ 64-66.
[415] *See* Alex Michaelowa, *CDM Host Country Institution Building,* 8 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 201, 203 (2003).
[416] *See* Conference of the Parties to the United Nations Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II),* Decision 17/CP.7 Annex, ¶ 5(f), U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume II)*].
[417] *See* CLIMATE CHANGE SECRETARIAT, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE: THE FIRST TEN YEARS 87 (2004), *available at* http//unfccc.int/resource/docs/publications/first_ten_years_en.pdf.
[418] *See* Pedro Moura-Costa & Marc D. Stuart, *Forestry-Based Greenhouse Gas Mitigation: A Short Story of Market Evolution,* 77 COMMONWEALTH FORESTRY REV. 191, 199 (1998) ("It became obvious that third-party certification was instrumental in the validation and credibility of these new transactions.").
[419] *See id.* at 196 (noting the danger that developing countries would transfer their inexpensive greenhouse gas reduction opportunities to industrialized countries because, in light of the fact that developing countries did not have emission commitments, the commodity was valueless).

despite the thorough capacity-building scheme envisioned by the climate change regime.[420]

Finally, since there is a wide range of scientific, technical, and technological expertise needed for different projects under the CDM, the Conference of the Parties conferred upon the Executive Board the authority to "establish committees, panels, or working groups to assist it in the performance of its functions."[421] The afforestation/reforestation working group was constituted under such authority.

At its fourteenth meeting, the Executive Board agreed to establish an Afforestation and Reforestation Working Group ("A&R WG") for forestry-related projects.[422] The A&R WG is responsible for commenting on proposed baseline and monitoring methodologies for forestry projects, preparing draft reformatted versions of those approved by the Executive Board, and recommending available options for expanding the applicability of approved afforestation and reforestation methodologies.[423] In this sense, the A&R WG works closely and in consonance with the Methodologies Panel, which, as agreed upon at the Executive Board's third meeting,[424] is designed to provide the Executive Board with recommendations on proposed new methodologies and baseline and monitoring plans, including those designed for afforestation and reforestation projects.[425]

iv. Provisions for Domestic Legal and Institutional Framework

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[420] Conference of the Parties to the United Nations Framework Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 2/CP.7, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*] (addressing capacity-building in developing countries).

[421] *See* Conference of the Parties to the United Nations Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II)*, Decision 17/CP.7 Annex, ¶ 18, U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume II)*].

[422] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., June 12-14, 2004, *Executive Board of the Clean Development Mechanism Fourteenth Meeting Report*, ¶ 13, U.N. DOC CDM-EB-14 (June 14, 2004).

[423] *See* Wolfram Kägi & Dieter Schöne, *Forestry Projects Under the CDM: Procedures, Experiences and Lessons Learned* 9-10 (U.N. Food and Agriculture Organization, Forests and Climate Change Working Paper No. 3, 2005).

[424] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Apr. 9-10, 2002, *Executive Board of the Clean Development Mechanism Third Meeting Report*, ¶ 48, U.N. DOC CDM-EB-03 (Apr. 17, 2002).

[425] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., June 9-10, 2002, *Executive Board of the Clean Development Mechanism Fourth Meeting Report*, ¶ 11, U.N. DOC CDM-EB-04 (June 10, 2002).

One of the core principles of the CDM is that participation is voluntary and dependent upon prior approval.[426] Furthermore, in accomplishing one of the CDM's objectives – assisting developing countries in achieving sustainable development – the Conference of the Parties requires project developers to obtain confirmation from the host country that a proposed project activity meets its sustainable development goals.[427] The procedural participation requirement imposed on non-Annex I Parties wishing to participate in the CDM and, therefore, externalize to project developers voluntariness and compliance with sustainable development goals, is the establishment of a designated national authority ("DNA").[428] This provision allows for the development of national legal and institutional frameworks by non-Annex I countries desiring to participate in the CDM.

For the purpose of this study, this was the case of Brazil. The country assigned the task of serving as the Designated National Authority to a commission entitled Interministerial Commission on Global Climate Change by a Decree dated of 7 July 1999 and further amended by a Decree of 10 July 2006. According to these regulations, the Commission's role is to articulate "governmental actions resulting from the United Nations Framework Convention on Climate Change and its subsidiary instruments in which Brazil takes part."[429] The Commission was conferred with decision-making power over additional eligibility criteria to those already established by CDM regulations and over project approvals, dependent upon whether it finds relevant to the country's sustainable development strategies and whenever deemed appropriate, respectively.[430] Through Resolution 2 of 10 August 2005, the Brazilian DNA reinforced the procedural requirements set forth afforestation/reforestation CDM project-activities under Decisions 19/CP.9 and 14/CP.10; provided definitions for forest for the purpose

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[426] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 12(5)(a), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[427] *See* Conference of the Parties to the United Nations Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II),* Decision 17/CP.7 Annex, ¶ 40(a), U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume II)*].

[428] *See id.* ¶ 29.

[429] THE BRAZILIAN MINISTRY OF SCIENCE AND TECHNOLOGY, *Decree of July 7, 1999, amended by Decree of January 10, 2006, available at* http://www.mct.gov.br/index.php/content/view/17026.html?toPrint+=yes, (last visited Feb. 10, 2009).

[430] *See* THE BRAZILIAN MINISTRY OF SCIENCE AND TECHNOLOGY, *Decree of July 7, 1999, amended by Decree of January 10, 2006,* art. 3 (III) (IV). *available at* http://www.mct.gov.br/index.php/content/view/17026.html?toPrint+=yes, (last visited Feb. 10, 2009).

of project qualification; and presented outlines for project submission building upon existing versions provided by the CDM Executive Board.[431]

Forest market-based policy incentives under these overall and general domestic and institutional legal framework launched by the climate change international regime is thus examined in light of the Atlantic Rainforest biome. Having analyzed the Atlantic forest's main environmental and socio-economical features, the following chapter turns to indentifying some of the main political and technical challenges currently facing the CDM forest carbon market. Whether or not these challenges can be overcome against the Atlantic forest's main features is instrumental to drawing a conclusion with respect to its efficacy.

5. Current Obstacles To, And Impacts Of, Forestry Activities Under the CDM

Due to its controversial nature, forestry activities under the CDM have been conducive to many assessments (both positive and negative) regarding the impacts resulting from their implementation. Moreover, the expansion of permitted forestry activities beyond afforestation and reforestation projects is facing political, legal, and technical obstacles. This section is dedicated to examining political, legal and technical challenges capable of influencing the negotiation process for a post-2012 deal that can impact how the CDM forest market is used in light of existing domestic rules and regulations designed and applicable to the Brazilian Atlantic forest.

a. Political and Legal Obstacles

G.J.H. van Hoof has pointed out that "[i]f dealy in, or failure of ratification are the result of unwillingness on the part of the States concerned, the problem, of course, is first of all of a political nature."[432] The United States's refusal to ratify the Kyoto Protocol, the EU's decision to reject CDM forestry projects, and the limitation of forestry to afforestation and reforestation activities, form the core obstacles currently facing the CDM forest market. The reasons underpinning each of these obstacles and how they are of significance for the Brazilian Atlantic forest is examined in this section.

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[431] *See* THE BRAZILIAN MINISTRY OF SCIENCE AND TECHNOLOGY, *Resolution 2* (Aug. 10, 2005), *available at* http://www.mct.gov.br/index.php/content/view/14779.html, (last visited Feb. 10, 2009).
[432] G.J.H. VAN HOOF, RETHINKING THE SOURCES OF INTERNATIONAL LAW 122 (1983).

i. The United States' Resistance to Ratify the Kyoto Protocol

In 1998, the U.S. Senate passed Senate Resolution 98, which "urged the President no to agree to a treaty that did not include binding commitments for developing countries, or that cause harm to the U.S. economy."[433] In March of 2001, the Bush Administration announced the rejection of the Kyoto Protocol,[434] shortly after the United States experienced the tragedies of September 11, 2001. Although it is not clear whether the terrorist attacks influenced U.S. policies with regard to the climate change legal regime, some have suggested that the lack of stronger involvement in the Kyoto Protocol over the past years indicates that the tragedy may have shifted the United States' focus.[435]

For what it represents economically and politically, the United States is major player in any international negotiation. Therefore, U.S. resistance to accepting the Kyoto Protocol constitutes a significant political obstacle to the development of forestry activities within the climate change regime. Moreover, because the country was among those pushing forward the ample use of forestry activities in the CDM legal framework during the Kyoto Protocol negotiation process.[436] By ratifying the Protocol, the United States could play a much greater role in pushing negotiations towards expanding eligible activities for future commitment periods and augmenting the demand for forestry credits.

ii. The EU's Refusal to Accept Carbon Forest Credits in its Emissions Trading Scheme

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[433] *See* JOHN R. JUSTUS & SUSAN R. FLETCHER, CONG. RESEARCH SERV., CRS ISSUE BRIEF FOR CONGRESS: GLOBAL CLIMATE CHANGE 10 (2004).
[434] *See id.* at 11.
[435] *See* Todd M. Lopez, Note, *A Look at Climate Change and the Evolution of the Kyoto Protocol*, 43 NAT. RESOURCES J. 285, 306 (2003).
[436] *See* SEBASTIAN OBERTHÜR & HERMANN E. OTT, THE KYOTO PROTOCOL: INTERNATIONAL CLIMATE POLICY FOR THE 21ST CENTURY 9, 131-32 (1999) ("[G]iven the absence of the US and the weakening of industrial country emission targets through higher allowances for sinks, the demand for emission reductions abroad will be much lower than originally anticipated.").

On January 1, 2005, the EU's ETS became the world's largest regional greenhouse gas emissions trading scheme.[437] The market for CERs created by the ETS significantly increased the demand for activities undertaken pursuant to the CDM. This was not the case for afforestation and reforestation activities, as the EU's provision authorizing the use of CERs expressly excluded their use with regard to LULUCF activities.[438] Since most of the countries with established commitments under the Kyoto Protocol are members of the EU,[439] the policy of excluding CERs from forestry project activities is a major obstacle for the enhancement of a stronger market in this area, which inevitably hampers the development of new forestry-based greenhouse mitigation projects under the CDM.[440]

iii. The CDM's Limitation to Afforestation/Reforestation Activities and the Proposal for the Inclusion of Reduce Emissions From Deforestation and Degradation ("REDD")

One of the major obstacles to the expansion of LULUCF projects in the CDM for the first commitment period is the limitation of activities to anthropogenic afforestation and reforestation practices. Preoccupation with ensuring the effectiveness of such a limitation compelled climate change negotiators to include it in at least three different decisions prior to the first Meeting of the Parties.[441] Moreover, "[t]he literature

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[437] *See* Marjan Peeters, The Enforcement of Greenhouse Gas Emissions Trading in Europe – Reliability Ensured? 3 (Oct. 16, 2006) (paper presented at the Fourth World Conservation Union ("IUCN") Colloquium on Environment Enforcement and Compliance, on file with the author).

[438] *See* Council Directive No. 2004/101/EC, art. 1, 2004 O.J. L 338, at 18, 21 ("All [Certified Emission Reductions ("CERs")] and [Emission Reduction Units ("ERU")] that are issued and may be used in accordance with the UNFCCC and the Kyoto Protocol and subsequent decisions adopted thereunder may be used in the Community scheme . . . except for CERs and ERUs from land use, land use change and forestry activities.").

[439] *See* United Nations Framework Convention on Climate Change, Annex I, May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[440] *See* Pedro Moura-Costa & Marc D. Stuart, *Forestry-Based Greenhouse Gas Mitigation: A Short Story of Market Evolution*, 77 COMMONWEALTH FORESTRY REV. 191, 197 (1998) (observing that uncertainty regarding the potential value of forestry projects greatly reduces the level of investment in these projects).

[441] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶ 13, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*]; *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II)*, Decision 17/CP.7, ¶ 7(a), U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter *COP-7 Report – Part Two (Volume II)*]; *See* Conference of the Parties to the United Nations Convention on Climate Change, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the*

regarding forestry as a climate change mitigation strategy suggests that efforts to constrain project-based forestry interventions to reforestation and afforestation projects is technically inappropriate."[442] As a result international pressure over crediting REDD activities was successful on including it in the debates for the post-2012 commitment period.[443]

During the SBSTA's twenty-seven session in 2007, members agreed upon a draft decision on REDD to be sent for the COP-13 in Bali, Indonesia.[444] Decision 1/CP.13 adopted the Bali Action Plan and in its article 1(b)(iii) expressly embraced "[p]olicy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries."[445] That resulted in the adoption by COP-13 of Decision 2/CP.13 specifically dealing with REDD approaches to stimulate action in developing countries.[446] Therefore, if for the first commitment period forestry activities were restricted to afforestation/reforestation practices under the CDM, at least for post-2012, the Bali Action Plan sent a clear message that the Parties to the UNFCCC are considering seriously broadening the scope of permitted forestry project-based activities.

The terms used in Decision 2/CP.13 are broad in nature and constitute a first step toward more specific regulations aimed at broadening the scope of the forest carbon

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Conference of the Parties at its Ninth Session, Decision 19/CP.9, pmbl., U.N. DOC. FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].

[442] Mark C. Trexler & Laura H. Kosloff, *The 1997 Kyoto Protocol: What Does it Mean For Project-Based Climate Change Mitigation?*, 3 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CLIMATE CHANGE 1, 29 (1998).

[443] *See Summary of the Thirteenth Conference of Parties to the UN Framework Convention on Climate Change and Third Meeting of Parties to the Kyoto Protocol*, EARTH NEGOTIATIONS BULL., Dec. 18, 2007, at 7, *available at* http://www.iisd.ca/download/pdf/enb12354e.pdf (explaining how REDD activities were included in the negotiations for a post-2012 commitment period under the climate change regime).

[444] *See* Twenty-Seventh Session of the Subsidiary Body for Scientific and Technological Advice, Bali, F.R.G., December 3-11, 2007, *Reducing Emissions from Deforestation in Developing Countries: Approaches to Stimulate Action – Note by the Secretariat*, U.N. DOC FCCC/SBSTA/2007/L.23/Add.1/Rev.1 (Dec. 12, 2007) [hereinafter *2007 SBSTA Report*].

[445] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 1/CP.13, ¶ 1(b)(iii), U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

[446] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 2/CP.13, U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

market under the CDM.[447] The importance of Decision 2/CP.13 is manifold. Like the inclusion of forestry activities in the CDM for the first commitment period, the debate over REDD is surrounded by methodological challenges and diversity among national circumstances.[448] But overcoming these obstacles brings about positive impacts of all sorts; from climate change mitigation to the promotion of ecosystem services and socio-economic benefits.[449] Because of that, the parties agreed through Decision 2/CP.13 to request the SBSTA to undertake further studies to present a detailed and operational proposal for the post-2012 negotiation phase.[450] Considering REDD shares most of the technical methodological challenges of forestry activities under the CDM, they are further examined in the following section.

b. Technical Methodological Challenges

According to the FAO, the forestry sector is "technically especially challenging in terms of the CDM project formulation. . . ."[451] And with regards to REDD, the Parties to the UNCCC at COP-13 recognized "the complexity of the problem, different national circumstances and the multiple drivers of deforestation and forest degradation. . . ."[452]

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[447] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 2/CP.13, pmbl., U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*]. ("*Recognizing* that efforts and actions to reduce deforestation and to maintain and conserve forest carbon stocks in developing countries are already being taken,").

[448] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 2/CP.13, pmbl., U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

[449] *See* Danilo Mollicone et al., *An Accounting Mechanism for Reducing Emissions from Deforestation and Degradation of Forests in Developing Countries, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 191, 191 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Reducing emissions from deforestation is therefore crucial in any effort to combat climate change. Reducing deforestation has many other positive aspects, such as preserving biodiversity, maintaining indigenous rights, and potentially bringing resources to local populations.").

[450] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 2/CP.13, ¶ 7, U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

[451] *See* Wolfram Kägi & Dieter Schöne, *Forestry Projects Under the CDM: Procedures, Experiences and Lessons Learned* 1 (U.N. Food and Agriculture Organization, Forests and Climate Change Working Paper No. 3, 2005).

[452] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 2/CP.13, pmbl., U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

The first substantial decision addressing accountability for domestic action on LULUCF came during COP-7. The Parties requested that the SBSTA develop definitions and modalities for including afforestation and reforestation while taking into account the issues of non-permanence, additionality, and leakage.[453] These technical concerns stemmed from problems the IPCC reported in its 2000 special report on LULUCF.[454] Furthermore, Decision 19/CP.9's requirement that non-Annex I countries opt for a definition of forest based on pre-established parameters[455] represented an additional technical challenge.[456]

If technical methodological issues are challenging under the CDM afforestation/reforestation scheme, they are just as complex under REDD initiatives.[457] Some attribute that as one of the reasons why REDD was left out from the CDM forestry regime.[458] While under the CDM these methodological issues are addressed by specific regulation, which are further detailed below, the debates for the inclusion of REDD on a post-2012 deal have just began.[459] Accountability is a major issue also

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[453] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I),* Decision 11/CP.7, ¶ 2(e), U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

[454] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS 5 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF] (bringing technical challenges related to LULUCF to the attention of policymakers).

[455] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the Conference of the Parties at its Ninth Session,* Decision 19/CP.9, ¶¶ 7-9 U.N. DOC. FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].

[456] *See* Till Neeff et al., *Choosing a Forest Definition for the Clean Development Mechanism* 1 (FAO, Forests and Climate Change, Working Paper No. 4, 2006), *available at* http://www.fao.org/forestry/webview/media?mediaId=11280&langId=1 (suggesting that choosing a definition for forest can be a difficult process).

[457] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 181 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The focus on monitoring and accounting for emissions from forests creates significant complexity for this sector that does not arise in other sectors.").

[458] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 181 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The increased complexity is the main reason addressing emissions from deforestation has been, and continues to be, a difficult, complex and often controversial issue.").

[459] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 2/CP.13, ¶ 7, U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*] ("*Requests* the Subsidiary Body for Scientific and Technological Advice to undertake a pogramme of work on methodological issues related to a range of policy approaches and positive incentives that aim to reduce emissions from deforestation and forest degradation in developing countries noting relevant documents;").

raising concerns over leakage, non-permanence, monitoring and on defining a baseline scenario. As science evolves to more accurate monitoring techniques over REDD activities, the more likely technical challenges can be overcome and, therefore, allowing for a definite regulatory framework for the post-2012 commitment period.[460]

i. Domestic Definition of Forest

In its 2000 special report on LULUCF, the IPCC highlighted that a successful forestry carbon offset program would necessarily depend on clear definitions of forest and forestry activities. Countries have defined the term forest in varying ways using different criteria, such as legal, administrative, or cultural considerations.[461] Nonetheless, for the successful implementation of LULUCF activities it is crucial to harmonize the definitions for the purposes of the climate change legal regime.[462]

In an attempt to harmonize domestic definitions, the annex to Decision 19/CP.9 imposed the requirement that countries define forests prior to participating in the CDM. This provision allowed the Parties some flexibility in defining forests. The Parties could opt for minimums: tree cover, land area, and tree height in values varying from 10-30%, 0.05-1 hectare and from 2-5 meters, respectively.[463] The Brazilian DNA through Article 3 of Resolution 2 of 10 August 2005, defined that to qualify for afforestation or reforestation project, a forest must not meet the following minimums: crown cover of 30%, land area of 1 hectare and height at maturity of 5 meters.[464]

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[460] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 2/CP.13, ¶ 7, U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*] (calling for concrete action towards more accurate methodological challenges).

[461] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS ¶ 16 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].

[462] *See* Robert T. Watson & David J. Verardo, *Preface* to INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].

[463] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the Conference of the Parties at its Ninth Session,* Decision 19/CP.9, ¶ 8 U.N. DOC. FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].

[464] *See* THE BRAZILIAN MINISTRY OF SCIENCE AND TECHNOLOGY, *Decree of July 7, 1999, amended by Decree of January 10, 2006, available at* http://www.mct.gov.br/index.php/content/view/17026.html?toPrint+=yes, (last visited Feb. 16, 2009).

The idea behind establishing a definition for forest as an eligibility criterion for CDM project participation was to provide the Parties with the ability to adjust their domestic definition according to their individual natural and geographic realities. An international uniform definition would not be able to encompass the enormous variety of ecosystems around the world, and would inevitably end up favoring some countries to the detriment of others.[465] Depending how dense is a forest ecosystem in a specific country that can either include or exclude it from participating in the CDM forestry scheme if a uniform definition was adopted. Only areas that do not meet the above stated minimum criteria set forth in the definition of forests are eligible for participating in CDM afforestation/reforestation project scheme.[466]

Soon after it was enacted, though, the definition requirement became another technical methodological challenge to forestry activities in the CDM. In 2006, the FAO issued a working paper aimed at serving as a guideline to assist countries on choosing the best forest definition for the purpose of maximizing participation in the CDM.[467] Based on criteria that would better serve the interests of a non-Annex I Party, the report set forth a ten-step procedure. The proper selection of parameters directly affects which areas are eligible for afforestation and reforestation projects and, therefore, is an important technical challenge that must be overcome.

ii. Selection of a Baseline Scenario and Assessment of Additionality

For the purpose of this study, the most critical technical methodological challenge facing CDM forestry activities is the selection of a baseline scenario from which additionality can be measured. To the extent the Brazilian Atlantic Rainforest biome can benefit from the CDM market-based incentive is dependent upon the effectiveness of the command-and-control regime in place and existing socio-economic

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[465] *See* Till Neeff et al., *Choosing a Forest Definition for the Clean Development Mechanism* 5-6 (FAO, Forests and Climate Change, Working Paper No. 4, 2006), *available at* http://www.fao.org/forestry/webview/media?mediaId=11280&langId=1 (discussing the array of definitions countries use for forests).

[466] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 74 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Because LULUCF-related CDM projects deal solely with afforestation and reforestation, only areas that do not fall under the forest definition are eligible for such activities.").

[467] *See id.* 6-7.

barriers that can be overcome with the implementation of a CDM forestry project. Therefore, understanding the concepts underlying the selection of a baseline scenario and assessment of additionality is a helpful methodological tool.

Article 12 of the Kyoto Protocol establishes that emissions reductions from CDM projects must be "additional to any that would occur in the absence of the certified project activity."[468] That is additionality. And "what would occur in the absence" of the proposed activity is the baseline scenario.[469] However, selecting a credible and feasible baseline scenario and determining additionality thereof is rather complex and a challenging methodological issue.[470] The rationale behind additionality lies in the fact that "if the developing nation would have undertaken the same emissions reduction project even in the absence of Annex I investment, the world could have enjoyed the same emissions reductions without the CDM and without giving Annex I countries credits that let them emit more."[471] Without the additionality requirement, a project-based market incentive loses its subsidiary nature and, instead, ends up contributing even further to the problem of global warming.[472]

To determine whether a CDM forestry activity is additional, a project developer must choose the proper baseline scenario from which additionality is to be measured. For both selection of baseline scenario and determining additionality, the CDM Executive Board provides specific non-binding guidelines.[473] Project developers

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[468] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 12 (5) (c), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[469] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶ 19, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*] ("The baseline for a proposed afforestation or reforestation project activity under the CDM is the scenario that reasonably represents the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the proposed forest activity").

[470] *See* MICHAEL GRUBB ET AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT 192 (1999) ("[T]he question of 'additionality' under the CDM – and possibly sinks – is so complex that it cannot be assumed that all emission reductions under these mechanism will be real and additional.").

[471] Jason Schwartz, Note, *"Whose Woods These Are I Think I Know": How Kyoto May Change Who Controls Biodiversity*, 14 N.Y.U. ENVTL. L.J. 421, 426 (2006).

[472] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 76 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Additionality is particularly important in excluding business-as-usual scenarios from the CDM. Given that the CDM is designed as a carbon-neutral process, it would be counterproductive if the additionality of a project could not be guaranteed.").

[473] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19: Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities*, U.N. DOC CDM-EB-35 (Oct. 19, 2007); *see* Meeting of the Executive Board of the Clean

although not bound by the regulations therein are strongly recommended to follow them.[474]

In selecting a baseline scenario, the general rule is found in Decision 5/CMP.1.[475] According to this framework rule, the determination of a baseline shall be based on three general criteria: 1) a baseline scenario is likely to be the one based on existing or historical land use practices, or simply the business-as-usual, presupposing continuation of the activity pre-CDM forestry project; 2) a scenario on which an economic factor is likely to alter the existing or historical business-as-usual practice; or 3) a change on current practices influenced by mandatory laws or regulations.[476]

Under this general framework, the A&R WG revised a tool for demonstration and assessment of additionality.[477] More recently, the CDM Executive Board, at its thirty-fifth meeting, updated and revised the first version of the aforementioned guidelines and adopted its second version[478] along with a "combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities".[479]

Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[474] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19: Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities*, ¶ 3, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[475] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶ 22, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[476] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 76 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Option 1 establishes a business-as-usual baseline approach for AR projects. It describes a continuation of current land use and should therefore be chosen if the "without-project" scenario is most likely a continuation of current land-use practices. Option 2 describes a change in land-use patterns due to economic factors. The difference between options 2 and 3 is not self-evident at first view. Under economic considerations, 'the most likely land use at the time the project starts' (option 3) is actually the on 'that represents an economically attractive course of action' (option 2). By presenting these two alternatives, the negotiators distinguished between a more economically motive land-use baseline scenario (2) and a more mandatory change in prevailing land use due to regulations and laws (3).").

[477] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Sept. 28-30, 2005, *Executive Board of the Clean Development Mechanism Twenty First Meeting Report Annex 16: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities*, at 8, U.N. DOC CDM-EB-21 (Sept. 30, 2005);

[478] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, U.N. DOC CDM-EB-35 (Oct. 19, 2007);

[479] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19:*

These more specific guidelines provide a stepwise approach for project developers in properly selecting a baseline scenario and assessing additionality. The main purpose of such guidelines is to demonstrate that "without finances derived from the trading of carbon credits, disadvantageous economics or other barriers would not have been overcome and the project would not have proceeded."[480] Consequently, identifying the existence or non-existence of financial and/or other legal or socio-economic barriers is an integral part of the stepwise approach provided by the baseline and additionality guidelines.

Of importance to this study are legal and socio-economic issues influencing the selection of a baseline scenario and assessment of additionality. In that regard, for instance, the guidelines indicate that national and/or sectoral policies must be considered in the selection of a baseline scenario. That means project developers must assess whether legal requirements imposing forestation of at least part of the area within the project boundary are in place.[481] If the selected baseline scenario is not in compliance with mandatory laws and regulations, it cannot be used as an alternative to the CDM project and, therefore, the chances of approving the proposed CDM forestry activity are null.

An accurate analysis of whether Atlantic forest compliance and enforcement command-and-control mechanisms corresponds with the actual practice, a thorough examination of the legal framework is provided in the following Chapter. But as an example, the Brazilian Forest Code determines that at least part of the public and private areas within the Atlantic Forest must be set aside for preservation or regeneration.[482] If a landowner is faced with the legal requirement of regenerating part of her/his land, this area is not suitable, in principle, to host a CDM forestry project. And that is because in selecting a baseline from which additionality is measured, a land use scenario that did not encompassed the Forest Code's legal reforestation mandatory rules cannot be used

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Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities, U.N. DOC CDM-EB-35 (Oct. 19, 2007);

[480] Timothy Pearson et al., *Project-Based Mechanisms: Methodological Approaches for Measuring and Monitoring Carbon Credits*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 135, 141 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008)

[481] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶ 9, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[482] *See* Law 4,771/1965, art. 1.II and 1.III, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.

according to the rules of the guidelines.[483] Moreover, when a project developer does identify a land use scenario upon which mandatory laws and regulations impose afforestation/reforestation activities, the CDM forestry project is not additional to what would have happened if it was not proposed.

The exception to this general rule is twofold: 1) whenever the mandatory laws or regulations "are systematically not enforced and non-compliance with those requirements is widespread"; and 2) if they were enacted after the adoption of Decision 17/CP.7 OF 11 November 2001.[484] The idea is that for the prior, if a law or regulation imposing forestation activities are not enforced or complied with in practice, than the proposed project is additional to the baseline scenario without it. That is extremely important, because even though most Latin American countries have developed protective forest legal frameworks, including Brazil, there is still a gap between written law and effective compliance and enforcement mechanisms thereof.[485]

For the second exception, the rationale lies on the fact that market-based forestry incentive may not constitute perverse incentive against developing countries developing mandatory set of rules of regulations aimed at protecting and regenerating forests.[486] If such exception was not included, many countries could opt for not developing protective legal frameworks fearing that could influence the selection of the land use baseline scenario and, consequently, the CDM project would no longer be additional. In balancing afforestation/reforestation activities with foreign capital versus bearing the costs of a domestic forestation command-and-control regime, developing countries

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[483] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶ 12, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[484] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶¶ 11-12, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[485] *See* Manuel Estrada Porrua and Andrea García-Guerrero, *A Latin American Perspective on Land Use, Land-Use Change, and Forestry Negotiations under the United Nations Framework Convention on Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 209, 214 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Overall, more than 10 percent of the territory of the region [Latin America] (213.54 million ha) is currently protected. . . . [h]owever, the indicator for protected areas reflects their legal status, not their degree of effective protection.").

[486] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, at 1, U.N. DOC CDM-EB-23 (Feb. 24, 2006) ("2. As a general principle, national and/or sectoral policies and circumstances are to be taken into account on the establishment of a baseline scenario, without creating perverse incentives that may impact host Parties' contributions to the ultimate objective of the Convention.").

could choose the prior jeopardizing the subsidiary nature of a market-based policy incentive.

But not the entire region of a forested biome may be protected by laws or regulations. Indeed, as the following chapter demonstrates, that is the reality for most of the Brazilian Atlantic forest. In that case, other socio-economic barriers preventing forestation[487] of the land may influence the selection of a baseline scenario. They include investment, institutional, technological, local tradition, prevailing practices, social and land tenure related barriers.[488] The purpose is to demonstrate that any socio-economical barrier or any combination thereof can only be overcome if the proposed activity is registered as a CDM forestry activity, in which case, the CDM project is deemed additional.[489]

Selection of a credible baseline scenario and assessment of additionality is ultimately conducted in a case-by-case basis. Therefore, many of the socio-economical barriers may vary within a single region. Even more so, if this region is a biome with an extensive territory and large socio-economic differences, like the Atlantic forest. Nonetheless, having examined the main environmental and socio-economical features of the Atlantic Rainforest biome,[490] some of those barriers become clearer and, therefore, can be identified as preventing forestation practices. As a result, a more accurate analysis is possible of how they can be overcome with assistance provided from the CDM forestry market incentive.

iii. Monitoring (Verification) and Accounting

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[487] For the purpose of the baseline and additionality tests, "forestation is used for the identification of possible land use scenarios that go beyond afforestation and reforestation as defined in the Marrakech Accords and includes the any establishment of forest through natural or artificial means." *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19: Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities*, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[488] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶ 28, U.N. DOC CDM-EB-35 (Oct. 19, 2007) (providing a detailed list of the possible socio-economical barriers).

[489] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶ 29, U.N. DOC CDM-EB-35 (Oct. 19, 2007) ("The identified barriers are only sufficient grounds for demonstration of additionality if they would prevent potential project participants from carrying out the proposed project activity if it was not expected to be registered as an A/R CDM project activity.").

[490] *See* above Chapter 2.

Monitoring and accounting are additional technical methodological challenges unique to CDM forestry project mechanisms due to the susceptibility of anthropogenic and natural disturbances of forest ecosystems.[491] Because of that, risks associated to non-permanence/reversibility, leakage and impacts on different ecosystem goods and services are higher. In different greenhouse gases offset projects other than forestry (i.e. renewable energy, fuel switching, energy efficiency, etc), the switch for a less carbon intensive activity represents a permanent greenhouse gas removal as long as the new technology remains in place.[492]

Consequently, because of a forest's susceptibility to disturbances, the credibility of carbon credits issued for afforestation/reforestation projects is constantly threatened.[493] That required the climate change regime to develop specific and detailed set of rules addressing the peculiarities of CDM forestry projects[494], adding complexity to the monitoring and accounting methodologies. The numbers of approved afforestation/reforestation baseline and monitoring methodologies are illustrative of such complexity. As of the writing of this study, there are ten approved methodologies for afforestation/reforestation projects, whereas there are more than sixty for energy efficiency and renewable energy activities.[495] The following subsections examine in deeper details the challenges of non-permanence and leakage inherent to monitoring and accounting under CDM forestry project activities.

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[491] *See* Joel N. Swisher, *Joint Implementation Under the U.N. Framework Convention on Climate Change: Technical and Institutional Challenges*, 2 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 57, 72 (1997) (noting the complexity of long term monitoring of LULUCF project activities).

[492] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 75 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Projects based on activities in the LULUCF sector differ in one crucial aspect from projects based on activities in other sectors, such as energy projects. In the latter, a tone of emission reductions, once achieved, remains a benefit to the atmosphere, whereas in the former, a tone of sequestered carbon is of benefit to the atmosphere only for as long as it remains in fact sequestered.")

[493] *See* Joel N. Swisher, *Joint Implementation Under the U.N. Framework Convention on Climate Change: Technical and Institutional Challenges*, 2 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 57, 63 (1997) ("In the case of power supply projects, the baseline can be relatively clearly determined from the carbon content of the fossil fuel replaced.").

[494] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS 10 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].

[495] *Compare* CDM: Afforestation/Reforestation Methodologies, http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html (last visited Oct. 22, 2007) *with* Methodologies for CDM Project Activities, http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html (last visited Dec. 11, 2007).

1. Non-permanence / Reversibility

According to the 2000 IPCC's Special Report on LULUCF, (non)permanence refers to "[t]he longevity of a carbon pool".[496] Because forests either in their mature or early stages of regeneration are subject to natural occurring phenomena such as windstorms, pests, fires, or to anthropogenic interference such as conversion to agricultural use, the risks of non-permanence are high.[497] To address the non-permanence risks of CDM forestry projects, the Parties adopted at COP-9 the IPCC's recommendation of limiting the validity of carbon credits issued by a forestry project.[498]

Accordantly, after a determined period of time, the carbon forest credit expires and must be replaced by a different one.[499] Hence, the crediting period was defined as being a minimum of twenty years (with the possibility of being renewed twice, for a maximum of sixty years) and a maximum of thirty years (without the option to renew).[500] Thus, contrary to carbon credits from non-forestry project activities, forestry credits expire and when used by an Annex I Party during a commitment period to meet its quantified emission reductions targets, the Party has to replace the forestry credit by a different one.[501]

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[496] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS 9 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].

[497] *See* Franck Lecocq and Stéphane Couture, *The Permanence Challenge: An Economic Analysis of Temporary Credits*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 125, 125 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Carbon sequestered in biomass or soils may be released accidentally because of fire, windstorms, or other natural hazards or because of conversion of the land to agriculture or pasture.").

[498] *See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Milan, Italy, Dec. 1-12, 2003, *Report of the Conference of the Parties on its Ninth Session – Part Two: Action Taken by the Conference of the Parties at its Ninth Session,* Decision 19/CP.9, Annex ¶ 23, U.N. DOC. FCCC/CP/2003/6/Add.2 (Mar. 30, 2004) [hereinafter *COP-9 Report – Part Two*].

[499] *See* Franck Lecocq and Stéphane Couture, *The Permanence Challenge: An Economic Analysis of Temporary Credits*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 125, 125 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("To deal with the risk of nonpermanence, carbon sequestration through land use, land-use change, and forestry (LULUCF) projects under the Clean Development Mechanism (CDM) generates credits with finite lifetimes.").

[500] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶ 23 (a) (b), U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[501] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶¶ 44-47, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

Differently from other types of activities, credits from afforestation/reforestation projects (Certified Emission Reductions – "CERs") are divided into "temporary" ("tCER") and "long-term" ("lCER"). A tCER "expires at the end of the commitment period following the one during which it was issued" and a lCER "expires at the end of crediting period of the afforestation or reforestation project under the CDM for which it was issued."[502] Project developers must opt up front whether they intend to use lCERs or tCERs and this decision is binding an unchangeable.[503] In practical terms, assuming a twenty-year nonrenewable forestry project started on January 2005 and a project developer opted for tCER, an Annex I Party may use the tCERs generated by this project to meet its emission reductions targets during the first commitment period (2008-12). But because tCERs expire "at the end of the commitment period subsequent to the commitment period for which it was issued", for the next commitment period, this Annex I Party must replace them with new CERs. For lCERs, an Annex I Party does not have to replace the tCERs until the end of the selected crediting period. Depending on the length of the project, that gives this Annex I Party more time before the expiration date upon which lCERs must be replaced.

In either case the burdens and liabilities from ensuring that an expired tCERs and lCERs is replaced and guaranteeing that net greenhouse removals underlying the credits are still positive lay with the buyers.[504] Because of that, forestry credits enjoy a lower market price than those of different nature.[505] And considering they can be

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[502] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶ 1 (g) (h), U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[503] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶ 39, U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[504] *See* Franck Lecocq and Stéphane Couture, *The Permanence Challenge: An Economic Analysis of Temporary Credits, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 125, 125-6 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The current rules thus create a double liability for the carbon buyer. First, if the carbon stock underlying the credit is no longer sequestered or is not reverified, then the holder of the credit suffers a debit that must be compensated for by the acquisition of a permanent credit or of another temporary credit based on a different carbon stock. The second liability arises at the end of the project's crediting period when a replacement has to be found whether or not the underlying carbon stock is being maintained.").

[505] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 76 (Charlotte Streck, Robert O'Sullivan, Toby

acquired at a lower price, it creates a market for non-Annex I Parties wishing to buy some time before they can meet its emission reductions targets by different means.[506] The decision over temporary or long-term CERs is equally market driven. Often sellers are likely to prefer tCERs because they can be sold every commitment period as long as project's net greenhouse gas removals remain positive.[507] In turn, buyers tend to prefer lCERs in light of the higher transaction costs of having to replace tCERs every commitment period.[508]

2. Leakage

Leakage is defined by the climate change regime as "the increase in greenhouse gas emissions by sources which occurs outside the boundary of an afforestation or reforestation project activity under the CDM which is measurable and attributable to the afforestation or reforestation project activity."[509] In practical terms, consider the hypothetical where a reforestation project is undertaken in a degraded piece of pasture land. If the conversion of the pasture land into forested area leads to the deforestation elsewhere to meeting the demand for new grazing land, the forestry project is experiencing leakage.

In order for leakage to be linked to a project activity, it has to be properly measured and causation with the project must be assessed. Leakage has to be part of a

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Janson-Smith, and Richard Tarasofsky eds., 2008) ("Because tCERs and lCERs are temporary, their prices are lower than the prices of (permanent) CERs from other CDM project categories.").

[506] *See* Franck Lecocq and Stéphane Couture, *The Permanence Challenge: An Economic Analysis of Temporary Credits*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 125, 126 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("[T]he fact that tCERs and lCERs have finite durations may also provide an opportunity for buyers seeking to gain time until carbon is less expensive – for example, because they anticipate that their emissions will fall in the future.").

[507] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 76 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("From the seller's perspective, the regulation means that tCERs can be sold every five years, which is an economically interesting feature of tCERs.").

[508] *See* Franck Lecocq and Stéphane Couture, *The Permanence Challenge: An Economic Analysis of Temporary Credits*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 125, 126 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("We suggest that few buyers are likely to be interested in temporary credits per se and that most will in fact demand quasi-permanent credits even from LULUCF projects.").

[509] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶ 1 (e), U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

monitoring and accounting process and thus has the potential to alter significantly the amount of carbon credits attributed to a project.[510] A project can also render "positive" leakage, when it leads to forestation outside of the project's boundary. However, that is not accountable under the climate change regime.[511] Finally, leakage is not only limited to afforestation/reforestation project activities, for conservation activities under REDD, proper monitoring and accountability also constitutes technical methodological challenges.[512]

c. Challenges under REDD Activities

If for CDM afforestation/reforestation activities the regulatory framework is already negotiated and the main technical methodological challenges resolved, under REDD projects the debate remains open. Basically, the same challenges facing CDM afforestation/reforestation projects are of concern to negotiators dealing with a proposal to include REDD for future commitment periods.[513] Issues like including accountability for forest degradation in addition to deforestation, defining proper criteria for the selection of a baseline scenario, monitoring and accounting including leakage and non-permanence, and other policy challenges such as the risks of market flooding are currently included in the negotiations over REDD activities. Through Decision 2/CP.13

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[510] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session,* Decision 5/CMP.1 Annex, ¶ 25 (c), U.N. DOC FCCC/KP/CMP/2005/8/Add.3 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[511] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 78 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("[O]nly leakage that *increases* emissions is to be taken into account, thereby precluding any claims for 'positive leakage' or 'spillover effects,' as when a project leads to additional forest planting or growth outside the project boundaries.").

[512] *See* Sebastian M. Scholz and Martina Jung, *Forestry Projects under the Clean Development Mechanism and Joint Implementation: Rules and Regulations, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 71, 78 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("In the case of avoided deforestation, usage restrictions might force people to clear forests elsewhere, which would counter the carbon reservoir protection.").

[513] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 231 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The issues of additionality, base period, leakage, and nonpermanence arise frequently in discussions about reducing deforestation in the UNFCCC context.").

negotiators invited the Parties to submit considerations on how to overcome these methodological challenges.[514]

First of all, whether allowing for deforestation only, or also including degradation is particularly challenging. While deforestation is the total forest loss, degradation has to be measured against the definition of forests provided by each country according to the minimums provided by the climate change regime.[515] Thus, if a country defines forest with a minimum tree crown cover of ten percent, anything below that – but excluding total forest loss - is considered degradation.[516] Although scientific knowledge evolved considerably since the 1992 UNFCCC,[517] monitoring degradation is still quite challenging due to differences in forested ecosystems, difficulties in verification techniques and the potential high costs involved. [518] Notwithstanding, because Decision 2/CP.13 expressly incorporated forest degradation, it indicates that this will be a forestry practice included for the post-2012 commitment period.[519]

Secondly, selecting reference emissions levels from which deforestation and degradation are measured is also of concern. Rates of deforestation and degradation

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[514] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 1/CP.13, ¶ 7(a), U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

[515] *See* Chapter 5.b.i. above.

[516] *See* Danilo Mollicone et al., *An Accounting Mechanism for Reducing Emissions from Deforestation and Degradation of Forests in Developing Countries, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 191, 193-4 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (proposing a definition of forest degradation "as the conversion of a forest from one of two subcategories to the other, with a different carbon content. Both subcategories remain within the framework of the UNFCCC forest definition. The first subcategory is that of *intact* forest. These are fully stocked, in that tree cover can range from 10 to 100 percent but must be undisturbed – for example, no timber extraction has taken place. The second subcategory, *non-intact* forest, is not fully stocked. That is, even though tree cover is greater than 10 percent, qualifying as a forest under existing UNFCCC rules, the forest may have undergone some timber exploitation.").

[517] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 229 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (noting that verification technologies such as remote sense technologies are improving rapidly).

[518] *See* Danilo Mollicone et al., *An Accounting Mechanism for Reducing Emissions from Deforestation and Degradation of Forests in Developing Countries, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 191, 193 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Policymakers have tried to reach agreement on a common definition of forest degradation, but no consensus yet exists, and some proposed definitions, such as temporary loss of biomass or canopy cover, could turn out to be impossible to measure or to track over time.").

[519] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 1/CP.13, pmbl., U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

differ significantly among countries.[520] Depending on how high or low a country's reference emissions level is set; crediting could benefit some countries in detriment of others based on national high or low rates of deforestation and degradation accordantly. Even when establishing a national reference level, in countries of continental size like Brazil, deforestation and degradation patterns vary among different forested biomes. For example, the Amazon forest preserves approximately 80% of its original cover and presents high rates of deforestation.[521] On the other hand, within the Atlantic Rainforest merely 7.26% remain preserved. Therefore, a national reference level for REDD is likely to benefit the Amazon in detriment of the Atlantic Rainforest.

To address unfairness among countries with different forest conversion patterns, a global baseline rate is proposed in which countries are grouped into different categories based upon individual rates of deforestation and degradation (i.g. high or low).[522] Moreover, the basis for defining reference emissions levels is also challenging. Historic deforestation and degradation rates are favored by many countries.[523] But the

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[520] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 185 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Countries have different rates of deforestation that change over time. This makes deciding when to measure baseline or reference emissions in order to calculate any emission reductions important.").

[521] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 232 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The procedure for selecting historical base periods (or reductions goals) must take into account the different regional dynamics of deforestation in the tropics. In Amazonia, for example, with approximately 80 percent of its original forest cover and high current deforestation rates, a base period for average annual deforestation rates set in the 1980s (since 1990 is the reference year for the Kyoto goals) would be adequate. Countries with substantial tropical forests and relatively little deforestation to date (for example, Peru and Bolivia) should be able to adopt higher baselines than their recent deforestation rates to provide an incentive to participate and to avoid future increases. Regions, that have been heavily degraded, such as Kalimantan, Sumatra, and Sulawesi, where 70 to 80 percent of the lowland *Dipterocarpaceae* forest cover has been removed in areas deforested and where conversion to oil-producing palm species is under way, would have to be handled differently. In such cases, a baseline could be expressed in terms of carbon stocks at some time in the past, with credit for any increase above this between, for example, 2008 and 2012, making reforestation or regeneration an alternative to palm plantations.").

[522] *See* Danilo Mollicone et al., *An Accounting Mechanism for Reducing Emissions from Deforestation and Degradation of Forests in Developing Countries*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 191, 195 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (proposing a global baseline rate cable of discriminating countries with high and low deforestation and degradation rates. "If a hypothetical remuneration mechanism were based only on national baselines, then countries with low forest conversion rates would see little or no benefit in making further reductions – if indeed such reductions were possible. A country with no forest conversion under way could not gain credits from reduced forest conversion, because there is no conversion to avoid. In these kinds of countries, deforestation could easily start, and the mechanism would fail in reducing deforestation worldwide.").

[523] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 185 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008)

problems of relying solely on historic reference levels is that current and future trends capable of influencing the baseline scenario are left out. Therefore, in this case, periodical methodological adjustments must be designed.[524]

Thirdly, leakage under avoided deforestation depends on whether the Parties decide for a national or a subnational approach in which to monitor and account for REDD activities.[525] A subnational approach is used for project-based market incentives, such as the current CDM forestry regime in which monitoring and accounting are restricted to a defined region within a country where the project takes place. In that sense, leakage must be measurable and attributable to the project activity. Strict rules are necessary because they are the only viable way to properly assess whether the forestry activity is not leading to deforestation elsewhere. The exception though is project-based market policy incentives within a closed cap-and-trade program. That is the case of the JI program under the Kyoto Protocol. Addressing leakage at the project-level under JI is not a major concern because even if a project developer omits any deforestation elsewhere, whenever the country submits its mandatory emissions inventory, deforestation practices appear and the Party is accountable for it.[526]

The national approach defines domestic deforestation and degradation reference levels from which accountability is measured. It is incumbent upon the national government then to ensure that deforestation and degradation remains below the domestic reference level. Whenever reductions are verified, REDD credits are conferred. On the flip side, failure to meeting the national target generates debits that

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("Most countries argue that historic rates of emission should be used, because these can be accurately assessed, whereas future rates are difficult to quantify.").

[524] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 185 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Looking at purely historical rates will also make it harder for countries with low levels of historical deforestation to participate in an incentive mechanism designed to reduce rates of deforestation. To address this, it is expected that any (national) reference level will be based on historic emissions but will inevitably be adjusted through negotiation to take into account countries' individual circumstances and development objectives.").

[525] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 183 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (differentiating leakage within the national from the subnational approach).

[526] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 182 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Domestic leakage under the CDM (for all projects) is accounted for on the project level through strict rules and regulations. Concern over how to address project-level leakage was one of the prominent reasons for originally excluding RED from the CDM. Joint Implementation, on the other hand, does not require the same strict project-level accounting, because domestic leakage will be reflected in a country's national inventory and overall emissions accounting.").

must be accounted for. Leakage in the national approach is dealt by each government according to the preferred set of policies chosen for compliance with the reference level.[527] Leakage would only be of concern to other Parties to the climate change regime if it was to be considered internationally. That means an avoided deforestation project in on country leading to deforestation in another.[528] But because cross-border leakage is currently not part of the climate change legal framework, a case is made in favor of leaving it aside for REDD activities as well.[529]

National approach is preferred because it is viewed as an attempt to establishing some sort of commitments upon developing country Parties.[530] In addition, most countries support a centralized system of forest governance that favors coordinated enforcement and compliance actions and policies.[531] Such approach also enables national governments to centralize and manage incomes from REDD credits. Disadvantages "include the reduced accuracy and increased uncertainty associated with national monitoring, increased sovereign responsibilities and potential for associated corruption, and uncertainty over how the private sector might participate in this type of

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[527] *See* Charlotte Streck et al., *Creating Incentives for Avoiding Further Deforestation: The Nested Approach*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 237, 240 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Reducing emissions from deforestation at a national level implies that countries are able to successfully implement effective policy, legal, and institutional reforms nationwide and are in the position to formulate and enforce appropriate social and economic safeguards.").

[528] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 233 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Leakage of deforestation per se from one country to another (for example, Brazilian soy planters who move to Bolivia) might occur, although participation by several countries in a geographical region (Amazonian countries, for example) in a compensated reductions mechanism would help address this problem. Furthermore, economic modeling of international timber trade might be able to identify international export leakage.").

[529] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 233 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (proposing that "international leakage – in all sectors, not just forestry – will be resolved only when all major emitters participate in an international emissions control regime.").

[530] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 234 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("More hazardous to the global climate system than any issue of leakage or permanence in carbon offsets from reducing deforestation is the prospect of failing to sustain and increase developing-country participation in a mandatory international emission reduction system.").

[531] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 183 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("It is argued that a top-down approach in which the central government is responsible for reforming land and forest policy and laws, corruption, and law enforcement is the most appropriate approach to reducing deforestation.").

system."[532] Additionally, the national approach faces opposition among the private sector due to the existing distrust on developing countries' governance performance.[533]

On the flip side, the subnational approach is favored by the private sector in light of the uncertainties surrounding the national approach.[534] Moreover, a project-based, subnational type of approach could benefit from the current regulatory framework in place for afforestation and reforestation activities under the CDM. The advantage is that the current baseline-credit CDM scheme already reflects more consolidated scientific knowledge on technical methodological challenges.[535] Relying on one unified international regulatory framework creates a more predictable environment than relying on a variety of different national set of policies and rules. Finally, a project-based approach is seen more beneficial to local and traditional communities on that it has the potential to attract direct participation and share incomes.[536]

Fourthly, considering REDD is one of the most cost-effective ways to mitigate climate change[537] and has the potential for considerable amounts of emission reductions, it can cause an oversupply of credits lowering overall abatement costs.[538]

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[532] Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 183 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008).

[533] *See* Charlotte Streck et al., *Creating Incentives for Avoiding Further Deforestation: The Nested Approach*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 237, 242 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("[T]he private sector has expressed reluctance to invest directly in developing country governments or in projects for which performance is linked to government performance in reducing emissions from deforestation and degradation nationally. In a system in which the allocation of funds and potential carbon credits takes place through host country governments, the political and legal risk of the mechanism is considered too high to attract private finance.").

[534] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 183 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("A number of private sector investors have indicated a preference for project-based accounting and crediting because it allows private sector investment in individual projects without exposure to sovereign performance risks.").

[535] *See* Charlotte Streck et al., *Creating Incentives for Avoiding Further Deforestation: The Nested Approach*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 237, 246 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Issuance of REDD credits for project activities would require that the activities be subject to a validation, verification, and certification procedure by an independent, accredited body.").

[536] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 184 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Project-based accounting may also enable funding to flow more readily to local communities and landowners, because it promotes the direct participation of these stakeholders.").

[537] *See* N. Stern et al., *Stern Review on the Economics of Climate Change*, 217 (2006), *available at* http://www.hm-treasury.gov.uk/stern_review_report.htm (detailing the costs of reducing emissions by avoiding deforestation).

[538] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND

That is a major technical challenge that must be resolved prior to including REDD activities in a post-2012 commitment period. The undesirable consequence of the so-called carbon credits market-flood, lowering overall abatement costs, is that REDD could undermine technological innovation as part of domestic efforts to reduce greenhouse gases emissions. Solutions to this problem range from proposals to cap the amount of REDD credits, to a specific and parallel market exclusively designed for avoided deforestation and degradation types of activities.[539]

Lastly, the non-permanence issue depends on the design and implementation rules agreed upon for REDD activities. If subnational, project-based, a new regime on REDD could benefit from the regulatory experience and expert knowledge developed for afforestation and reforestation projects under the CDM. Basically, credits would be issued temporarily and upon expiration would have to be replaced by new ones.[540] Liability lies with the buyer who is responsible for ensuring carbon sequestration is underlying the forestry credits. Under a national approach, credits would be permanent and conditional to whether a country succeeds on staying below its reference level.[541] If above the baseline scenario, a seller liability rules would then apply and possibilities range from a country having to acquire credits elsewhere to meet its reduce deforestation/degradation commitments,[542] to taking stronger reduction obligations in subsequent commitment periods.[543]

MARKET OPPORTUNITIES 227, 231 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Fears of flooding the market with cheap carbon from avoided deforestation are often voiced. Obviously some limit could be placed on allowable offsets, but even in the absence of a cap, flooding is unlikely to occur.").

[539] *See* Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 186 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (listing available solutions to address market flooding).

[540] *See* Charlotte Streck et al., *Creating Incentives for Avoiding Further Deforestation: The Nested Approach*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 237, 247 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("To further enhance the contribution of developing countries to global emission reductions, credits issued rewarding emission reductions from specific activities could be either temporary, with no project and no host-country liability (similar to tCERs), or permanent, with a mandatory reserve of credits to be transferred to the national reserve aacount.").

[541] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 229 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The risk that countries having received compensation for reducing their emissions might subsequently increase them could be addressed in several ways. Disallowing access to the market for countries that had received compensation and subsequently exceeded their baseline deforestation rate until net deforestation was reduced below the baseline would limit crediting of impermanent reductions while maintaining the voluntary character of the mechanism.").

[542] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND

All in all, regardless of the outcome of the negotiations for REDD to be included in a second commitment period under the climate change regime, political and technical methodological challenges remain. Just like in the regulated CDM forestry market currently in place, understanding existing challenges and obstacles is critical to a successful national policy formulation process. The potential for additional ecosystem goods and services under an international REDD scheme must push forward domestic instrumental action in areas such as effective protective and taxation laws and regulations, local and traditional community involvement and a clear and stable property and land tenure regime. Additionality, regional socio-economical barriers must be identified and national development goals clearly stated to maximizing the potentials of a REDD scheme.[544]

d. Ecological and Socio-Economical Hurdles

According to the IPCC's 2000 special report on LULUCF, forestry projects in the CDM "aiming to mitigate climate change may provide socio-economic and environmental benefits primarily within project boundaries, although they may also pose risks of negative impacts."[545] Even within the voluntary market, with promising additional ecosystem services for avoided deforestation activities, proper environmental

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MARKET OPPORTUNITIES 227, 233 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Permanence can be assured in a compensated reduction mechanism by requiring participating countries that increase deforestation (emissions) above the levels of their base periods subsequently to assume the surplus emitted as an obligatory reduction goal.").

[543] *See* Charlotte Streck et al., *Creating Incentives for Avoiding Further Deforestation: The Nested Approach, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 237, 245 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("[I]n case of future emissions above the target emission level, the implementing country could choose to (1) offset the excess emissions by canceling REDD credits from its reserve account or by acquiring REDD credits from other implementing countries' reserve accounts (2) overcomply in the subsequent verification period by a quantity of emission reductions equivalent to the excess deforestation emissions of the previous verification period; or (3) request an adjustment of its target emission level for the subsequent verification period, arguing justifiable reasons of force majeure (such as large-scale forest destruction due to extreme climatic events and their consequences, war, terrorism, and so forth) or improvements in the availability of data and methods.").

[544] *See* Stephan Schwartzman and Paulo Moutinho, *Compensated Reductions: Rewarding Developing Countries for Protecting Forest Carbon, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 227, 231 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("[I]n all large remaining or future tropical forest frontiers, governments must substantially invest in long-term governance frameworks (monitoring and enforcement capability, organization of land tenure, and allocation of property rights) before carbon compensation can become a direct economic alternative for individuals and companies.").

[545] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS 15 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].

impact analyses can reveal adverse obstacles obstructing a proposed project. Within the Kyoto regulated forest market, environmental and socio-economic impacts were expressly embraced by the CDM Executive Board's baseline and additionality guidelines. They include investment, institutional, technological and local tradition related barriers, obstacles due to prevailing practices, local ecological and social conditions and challenges relating to property rights.[546] Moreover, the climate change legal regime required a socio-economic analysis whenever deemed relevant by the country hosting the project or the project participants.[547]

In light of the Atlantic Rainforest historical, environmental and socio-economical background described above,[548] some of these obstacles are of particular relevance. According to the CDM Executive Board's guideline for the selection of a baseline and demonstration of additionality, any environmental and socio-economical barriers preventing a projected baseline scenario must be identified. Once they have been identified, additionality is confirmed if those barriers can be overcome by the implementation of a CDM afforestation/reforestation project.[549] Albeit not regulated and not always mandatory, the same concept is carried over to the voluntary market upon which lies the expectation that the implementation of a forestry project is able to raise business-as-usual socio-economical standards. Below, this study identifies specific socio-economical challenges recurrent to the Atlantic Rainforest biome in general that can be overcome by forest market initiatives.

i. Conversion of Old-Established Mature Forests Into Fast-Growing Commercial Tree Plantations

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[546] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities*, ¶ 29 U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[547] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session*, Decision 5/CMP.1 Annex, ¶ 12(c), U.N. DOC FCCC/KP/CMP/2005/8/Add.1 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[548] *See* above Chapter 2.d.

[549] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities*, ¶ 29 U.N. DOC CDM-EB-35 (Oct. 19, 2007).

One of the major concerns during the negotiations over allowable forestry activities under the Kyoto market-based approach was that a vast array of practices could encourage the replacement of mature forests by fast-growing commercial tree plantations with higher rates of carbon sequestration.[550] Commercial tree plantations are recurrent within the Atlantic Rainforest biome to feed the demands of the country's most industrialized areas.[551] However, that was addressed by Decision 11/CP.7 imposing a historical baseline to the definitions of afforestation and reforestation practices.[552] For qualifying as a forestry project under the CDM, the proponent has to demonstrate that the land had not been forest for at least fifty years and on areas that were not forest on 31 December 1989.[553] That enjoined project developers from deforesting an area for further reforestation seeking the revenues of carbon credits thereof.

Two additional approaches to avoid harmful conversions are: 1) allowing for REDD types of projects; 2) including accountability requirements for carbon emissions associated with deforestation/degradation practices prior to any forested land is replaced with and/or converted into fast-growing commercial tree plantations.[554] Even though mature forests do not enjoy the same carbon sequestration rates than fast-growing forests, they have carbon storage potentials that can be equally credited in the form of "avoided emissions."[555] Within the Kyoto regulated market, though, some degree of flexibility with respect to the requirement that forest activities must be "human-

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[550] *See* Janine Bloomfield & Holly L. Person, *Land use, Land-use Change, Forestry, and Agricultural Activities in the Clean Development Mechanism: Estimates of Greenhouse Gas Offset Potential,* 5 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 9, 12 (2000) (expressing a concern prior to the regulation of CDM forestry activities that afforestation/reforestation practices could incentivize the replacement of old-growth mature forest by fast-growing tree plantations).

[551] *See* André Giacini de Freitas, *Manejo* [Forest Management], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 285, 287 (Beto Ricardo and Maura Campanili eds., 2008) (noting the high occurrence of tree plantations on the Atlantic Rainforest biome).

[552] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I),* Decision 11/CP.7 Annex , U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

[553] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I),* Decision 11/CP.7 Annex , U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

[554] *See* Janine Bloomfield & Holly L. Person, *Land use, Land-use Change, Forestry, and Agricultural Activities in the Clean Development Mechanism: Estimates of Greenhouse Gas Offset Potential,* 5 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 9, 12 (2000) ("[A]s long as carbon dioxide emissions associated with deforestation are taken into account (i.e., a full carbon accounting), replacing mature forests with plantations will generally not yield a net carbon benefit.").

[555] *See* Mark C. Trexler & Laura H. Kosloff, *The 1997 Kyoto Protocol: What does it Mean For Project-Based Climate Change Mitigation?*, 3 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 1, 29 (1998) (arguing against limiting forestry projects to afforestation and reforestation activities).

induced" would have to be provided in order to allow for avoided deforestation/degradation activities.[556]

ii. Impacts on Ecosystem Services

A proper assessment of perverse incentives in the forestry market-based scheme, such as the above described conversion of mature forests on fast growing commercial tree plantations, is critical for a variety of potential additional ecosystem services other than just climate change mitigation. In that sense, forest market-based schemes allowing for avoided deforestation practices, biodiversity and all related ecosystem services stand to benefit considerably. Considering the potential irreversibility of some the adverse impacts, environmental analyses are of crucial importance.

On the one hand, introduction of alien species,[557] increases in erosion processes[558] and the impairment of hydrological cycles and water resources are among the potential threats posed by afforestation/reforestation project activities.[559] On the other hand, if well designed and planned, any forestry activity can generate some positive environmental impacts and raise sustainability standards of a host country or region hosting the project.[560] An SBSTA synthesis report on projects conducted during the AIJ Pilot Phase identified some of those positive impacts on natural ecosystems, such as improvements in water quality and reductions in the erosion of hydrological resources.[561]

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[556] *See* MICHAEL GRUBB ET AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT 79 (1999) (noting that some Parties at the Kyoto Protocol negotiations did not want to confer credits for activities that were naturally occurring).

[557] *See* Jason Schwartz, Note, "*Whose Woods These Are I Think I Know": How Kyoto May Change Who Controls Biodiversity*, 14 N.Y.U. ENVTL. L.J. 421, 423 n.6 (2006) (noting the fierce debate over allowing invasive species (also known as alien, exotic, or non-indigenous species) to be used in CDM reforestation projects).

[558] *See* Robert J. Zomer et al., *Carbon, Land and Water: A Global Analysis of the Hydrologic Dimensions of Climate Change Mitigation through Afforestation/Reforestation* 3 (International Water Management Institute, Research Report No. 101, 2006).

[559] *See id.* at 3-5.

[560] It is worth noting that the same provisions in the climate change regime designed to protect biodiversity are extended to the protection of natural ecosystems. *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session*, Decision 5/CMP.1, Annex, ¶ 12 (c), U.N. DOC FCCC/KP/CMP/2005/8/Add.1 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*].

[561] *See* above Chapter 4.

In selecting a baseline scenario under the CDM Executive Board's guidelines, project developers identified ecological barriers impeding the natural regeneration of an area within the Atlantic Forest. Because legally protective provisions do not require human-induced regeneration practices, project developers were successful in demonstrating an "[u]nfavourable course of ecological succession" due to the occurrence of "[p]ervasive species preventing regeneration of trees."[562] Interestingly, this ecological barrier was contrary to the spirit of the law mandating the landowner to set the area aside for the purpose of natural regeneration. But what legislators did not take into account was ecological barriers are often present and can prevent natural regeneration. Thus, within the Atlantic Rainforest, this is a clear example of an environmental hurdle overcome by the implementation of a forestry project activity. In any event, the guidelines for the selection of a baseline scenario and assessment of additionality provide a list of possible barriers due to ecological conditions that include: degraded soil, catastrophic natural and/or human-induced events, unfavourable meteorological conditions and biotic pressure in terms of grazing and fodder collection.[563]

Considering the size of the region encompassed by the Atlantic forest and its different climatic patterns, those are all potential ecological barriers standing on the way of conservation and regeneration policies that can be overcome with the implementation of a well designed and planned forestry project activity. Ultimately, because ecological barriers must be assessed on a case-by-case basis, only at the project level a more accurate assessment can disclose their occurrence. The bright side, as demonstrated by the above mentioned Atlantic Rainforest project, is that market-based forestry incentives once implemented have the potential to increase ecological standards throughout the region and, with that, benefit the entire Atlantic Rainforest biome.

iii. Socio-Economical Challenges

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[562] *See* Clean Development Mechanism Project Design Document for Reforestation and Afforestation Project-Activities, *AES-Tiete Afforestation/Reforestation Project Activity Around the Borders of Hydroelectric Plant Reservoirs, ARNM0034, 2007*, at 3, U.N. DOC FCCC/SB/2000/XX, Version 3, (Mar. 5, 2007).

[563] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19: Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities*, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

Another set of barriers listed by the CDM Executive Board of relevance to the Atlantic Rainforest region are those due to social conditions. As described above, the region faces major demographic pressure, but also widespread illegal practices and social conflicts between landless movements and landowners.[564] These, in addition to the lack of skilled and trained labor force, are all social barriers listed by the CDM Executive Board's guidelines and that potentially face any forestry project activity undertaken on Atlantic Rainforest biome.[565]

In practical terms, the region suffers from over exploitation of non-timber product extraction such as heart-of-palms and capture of exotic wildlife and flora for illegal trading.[566] Social land conflicts between landless organized groups and farmers and ranchers are recurrent throughout many parts of the Atlantic Rainforest region.[567] These are serious problems that public policies have not yet managed to resolve.[568] In that sense, forestry project activities in a case-by-case basis might be able to include and benefit low-income communities living from the illegal exploitation of the forest, assisting on promoting capacity-building and serving as an additional source of income constituting an additional instrument available to policy-makers.[569]

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[564] *See* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 153 (Beto Ricardo and Maura Campanili eds., 2008) (highlighting the threats facing the Atlantic Forest); *see also* Carlos Eduardo Frickmann Young, *Socioeconomic Causes of Deforestation in the Atlantic Forest of Brazil*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 103, 104 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) (highlighting that within the period of contracting economic and demographic pressure, "the emergence of a class of workers who have lost their jobs or have become impoverished farmers, the "new poor", leads to exhaustion of remaining natural resources, further invasion of forest reserves, use of less suitable land for agricultural, and, ultimately perpetuation of cycles of poverty.").

[565] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19: Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities*, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[566] *See* Mirian Prochnow, *Mata Atlântica* [Atlantic Forest], *in* ALMANAQUE BRASIL SOCIOAMBIENTAL 144, 153 (Beto Ricardo and Maura Campanili eds., 2008).

[567] *See* Brazil's Landless Workers Movement official website, *available at* http://www.mstbrazil.org/?q=about (describing the movement's work and activities within Brazil).

[568] *See* Carlos Galindo-Leal and Ibsen de Gusmão Câmara, *Atlantic Forest Hotspot Status: An Overview*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 3, 10 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Despite the many legal instruments that have been devised to protect the Atlantic Forest hotspot, inhabitants continue to engage in many illegal activities. Logging, poaching of flora and fauna, and illegal settlements all contribute to the loss and deterioration of remaining forests. In addition, lack of coordination between government agencies, both federal and state, has resulted in contradictory policies, which in turn have had severe environmental consequences.").

[569] *See* Janine Bloomfield et al., *Land-Use Change and Forestry in the Kyoto Protocol*, 5 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CHANGE 3, 6 (2000) ("[F]or projects to be conceived of, designed, and successfully implemented, stakeholder support, both by project funders and by the host countries and local communities is crucial.").

Once again, based on the experiences gained during forest project activities within the AIJ Pilot Phase[570] and reported from the voluntary market practice,[571] LULUCF projects can significantly increase capacity-building and employment opportunities in developing countries. Moreover, forestry activities have the potential to benefit local communities through the transfer of new sound technologies and generate additional source of income to low-income populations.[572] A social-economic analysis at the project level is capable of identifying the existence of any social challenge and, therefore, serving as the means to meet the additionality requirement upon the selection of a baseline scenario within a regulatory market,[573] or just simply aimed at raising the region's social indicators within the voluntary market.[574]

iv. Institutional and Legal Barriers

The CDM Executive Board's guidelines list a variety of different institutional and legal barriers ranging from land tenure, ownership, inheritance and property rights to risks related to the stability of the legal order and lack of environmental law compliance and enforcement instruments.[575] Even though not enjoying outstanding

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[570] *See* Seventh Session of the Subsidiary Body for Scientific and Technological Advice, Bonn, F.R.G., October 20-29, 1997, *Activities Implemented Jointly Under the Pilot Phase: Synthesis Report on Activities Implemented Jointly – Note by the Secretariat*, ¶ 6(c), U.N. DOC FCCC/SBSTA/1997/12 (Oct. 7, 1997) [hereinafter *1997 SBSTA Report*].

[571] *See* The Climate, Community & Biodiversity Alliance ("CCB"), *The Monte Pascoal – Pau Brasil Ecological Corridor: Carbon, Community and Biodiversity Initiative – Monte Pascoal Farm – CPA#1*, 7, *available at* http://www.climate-standards.org/projects/files/cpa_dd_caraiva.pdf (last visited 31 Mar., 2009) (describing the socio-economic benefits upon project implementation).

[572] Even before tighter regulations on modalities and procedures for forestry projects in the CDM were promulgated at COP-9 in 2004, the IPCC had indicated that enabling local stakeholders to share the financial benefits of CDM forestry activities was a necessary social condition. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE ("IPCC"), IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY ("LULUCF") – SUMMARY FOR POLICYMAKERS ¶ 90 (2000), *available at* http://www.ipcc.ch/pub/srlulucf-e.pdf [hereinafter IPCC SPECIAL REPORT ON LULUCF].

[573] *See* Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, *Report of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session – Part Two: Action Taken by the Conference of the Parties Serving as the Meeting of the Parties at its First Session*, Decision 5/CMP.1 Annex, ¶ 12(c), U.N. DOC FCCC/KP/CMP/2005/8/Add.1 (Mar. 30, 2006) [hereinafter *COP/MOP-1 Report – Part Two*] (providing for a socio-economic impact assessment in case a preliminary analysis indicates the potential for adverse socio-economic impacts).

[574] *See* Katherine Hamilton et al., *Carving a Niche for Forests in the Voluntary Carbon Markets*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 292, 294 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (highlighting the potential of forestry project activities in the voluntary markets to "foster sustainable rural development and directly affect the lives of the poorest people.").

[575] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19:*

governance indicators, Brazil has a quite stable set of policies and laws and political stability.[576] Consequently, that does not constitute a barrier worthy of further analysis for forestry projects within the Atlantic Rainforest region. With respect to lack of compliance and enforcement with protective laws and regulations, Chapter 6 below is entirely dedicated to this analysis.

Even considering that over 70% of the Atlantic Rainforest biome falls within private property domain,[577] Brazil still has an inefficient property rights legal and regulatory framework.[578] Information over property titles in Brazil is scattered and the country still lacks a uniform computerized consultation system.[579] Illegal settlements and the lack of governmental action along with slow judicial response in addressing private property usurpation is an additional element inherit to Brazil.[580] Under the examples provided by the CDM Executive Board's guidelines illustrative of barriers related to property rights, these aforementioned circumstances are likely to constitute an obstacle preventing the implementation of a forestry project in the Atlantic Rainforest region. Again, successful implementation of a forestry project can prove to be the overarching instrument capable of overcoming such barriers.[581] Because implementation, monitoring and accounting rules require a clear set of ownership and property rights framework, carbon forest activities have the potential to influence positively the baseline scenario and, thus, be additional to what would otherwise happen without the proposed forestry project.

Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[576] *See* World Bank, The Worldwide Governance Indicators (WGI) Project (2007), *available at* http://info.worldbank.org/governance/wgi/index.asp (providing governance indicators for 212 countries and territories for six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption).

[577] *See* above Chapter 2.d.

[578] *See* Doing Business, Measuring Business Regulations (2009), *available at* www.doingbusiness.org (listing Brazil in 111th place in a rank of 181 countries on measuring the efficiency of registering property).

[579] *See* Doing Business, Measuring Business Regulations (2009), *available at* www.doingbusiness.org (describing the methodology and research for measuring registering property efficiency in 181 countries).

[580] *See* Ngai Pindell, *Finding a Right to the City: Exploring Property and Community in Brazil and in the United States*, 39 VAND. J. TRANSNAT'L L. 435, 448-49 (2006) ("Brazil has continually struggled with the tension between laws declaring strong protections for private property rights and other laws recognizing extra-legal claims to property possession and similar characteristics of property ownership. It is possible that this tension merely exacerbates some state of chronic confusion and chaos within Brazilian property laws. New property laws, through quantity and contradiction, may effectively add more layers of confusion to existing property relationships and contribute to an increasing normalizing of extralegal solutions to most property disputes.").

[581] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶ 29 U.N. DOC CDM-EB-35 (Oct. 19, 2007).

Other obstacles such as barriers related to markets, transport and storage; unregulated timber markets, remoteness and price risks while might be of applicability to few projects in the region, are not relevant for the development of a general policy analysis. Because the Atlantic Rainforest region is the most developed in the country, infrastructure, more efficient States and municipal institutions and higher community involvement constitute sufficient grounds for ruling out these aforementioned social barriers from which a general policy could be drawn. Ultimately, only a prior socio-economic analysis on a project-by-project basis is able to effectively identify and assess whether social barriers can be overcome by a forestry project-activity either in the regulated or voluntary forest carbon market.

v. Other Socio-Economical Barriers

The CDM Executive Board's guidelines on the selection of a baseline and assessment of additionality list a whole set of additional socio-economical barriers that may prevent the implementation of a forestry project activity. They include investment, economic/financial, technological obstacles and barriers due to prevailing practices and those related to local tradition.[582] Once again, while these barriers might apply to a proposed project within the Atlantic Rainforest region, they must be addressed in a case-by-case basis rather than being part of a broader policy analysis proposed by this study. First, because the region by now has hosted several forestry project activities from the voluntary and regulatory markets which rules out the example listed for barriers due to prevailing practices as the project activity being "the first of its kind." Second, the Atlantic Rainforest is the most developed biome in Brazil and any traditional knowledge or the lack thereof, along with traditional equipment and lack of technology, while can be a problem for a few projects, are not likely to constitute a barrier due to the proximity and involvement of well developed research and scientific centers and organizations. Ultimately, investment, economic and financial barriers can only be detected on a case-by-case basis demonstrating that they can be overcome with

[582] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶ 28 U.N. DOC CDM-EB-35 (Oct. 19, 2007).

the profits from the commercialization of the carbon credits arising from forestry project activities.[583]

6. An Analysis of The Atlantic Rainforest Legal Framework and Relevant Compliance and Enforcement Mechanisms in Light of the Regulatory and Voluntary Carbon Forest Markets

Identifying the legal and regulatory framework applicable to the Atlantic Rainforest and the available compliance and enforcement mechanisms is a required component in assessing whether the CDM forestry carbon market can assist on promoting forestry practices. If, for instance, an afforestation or reforestation activity is mandatory under an existing statute, it constitutes strong evidence the activity would have happened even in the absence of the market incentive.[584] Consequently, unless the project developer is able to demonstrate that the mandatory statute is not enforced nor complied with in practice, the proposed forestry project-activity would fail the additionality test.[585] The reason of such a requirement was to avoid crediting of an activity that would have happen even without the market incentive, in which case the economic incentive loses its subsidiary nature upon which it was conceived in the first place.[586]

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[583] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, ¶ 29 U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[584] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, at 1, U.N. DOC CDM-EB-23 (Feb. 24, 2006) ("2. As a general principle, national and/or sectoral policies and circumstances are to be taken into account on the establishment of a baseline scenario, without creating perverse incentives that may impact host Parties' contributions to the ultimate objective of the Convention.").

[585] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, at 1, U.N. DOC CDM-EB-23 (Feb. 24, 2006) ("3. National and/or sectoral land-use policies or regulations, which give comparative advantages to afforestation/reforestation activities and that have been implemented since the adoption by the COP of the CDM M&P [**decision 17/CP.7, 11 November 2001**], need not be taken into account in developing a baseline scenario [i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place].").

[586] The subsidiary nature of the carbon market under the CDM is clear under the additionality requirement of Article 12.5(c) of the Kyoto Protocol. *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Art. 12 (5) (c), Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol];

On the flip side, that creates a perverse incentive for countries not to develop forestry legislation, concerned with the concrete possibility of missing carbon market opportunities and the inflow of foreign capital associated to it. The reason is simple: why would legislators impose upon their own or upon domestic agricultural and industrial sectors the burden of reforestation and afforestation policies if they can count on foreign capital to do so? As noted above, enacting legislation on that end could jeopardize the promising inflow of external capital. But to avoid that from happening, the CDM Executive Board established that only national forestry legislation enacted before Decision 17/CP.7 of 2001 would be considered in the development of a baseline scenario.[587] In other words, countries hosting CDM forestry projects could then enact forestry legislation without fearing that those statutes would impair the additionality test.

Moreover, the 2001 onwards baseline for domestic forestry legislation has an exception to accommodate cases in which pre-2001 policies mandating reforestation/afforestation practices are not enforced nor complied with in practice. In that sense, if a project developer can demonstrate that even though enacted, pre-2001 forestry policies are not being put into place, then the proposed activity can be additional to what would have happened without it.[588] That translates into using the carbon forest market as an enforcement and compliance tool additional to a pure command-and-control system. Such permission goes beyond the subsidiary nature of carbon markets limited to cases for which no mandatory policy is in place. It is a formal recognition that economic instruments can play an important function in the

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See Rômulo Silveira da Rocha Sampaio, *Biofuels and International Carbon Markets*, *in* PROCEEDINGS OF THE CONFERENCE THE ENVIRONMENTAL LAW PROGRAM AT PACE LAW SCHOOL – CELEBRATING 30 YEARS OF ENVIRONMENTAL LAW 38, 40 (Virginia A. Curry & C. Nicole Simmons eds., 2007) ("The benefits of carbon credits generation from any innovative clean energy initiative must always be analyzed in light of its subsidiary nature and in comparison with the environmental benefits. In other words, due to the fact that international carbon markets have become extremely attractive to corporations and individuals interested in the great sums of money potentially involved in this type of transaction, many tend to view emissions trading programs as an end in themselves, as opposed to a means of achieving a higher environmental benefit.").

[587] Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, at 1, U.N. DOC CDM-EB-23 (Feb. 24, 2006).

[588] Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, at 1, U.N. DOC CDM-EB-23 (Feb. 24, 2006).

State's traditional role based upon a command-and-control system of promoting compliance with and enforcement of domestic environmental laws.[589]

In either of the above stated carbon market roles, identifying the Atlantic Rainforest regulatory framework and relevant compliance and enforcement provisions is essential to understanding whether carbon forest markets are effective in promoting environmentally sound forestry practices in the region. Obviously, the detailed examination of the domestic forest legal framework below is only relevant for those regulated areas within the Atlantic biome. For areas being put into a productive use upon which no regulatory conservation and preservation easement exist likewise upon which there is no afforestation, reforestation or regeneration mandatory requirement, no legal analysis is necessary to assess whether a proposed-forestry activity is additional to a business-as-usual scenario or to understand how carbon markets can maximize compliance with existing regulations. Rather, for areas upon which no forestry restriction or regeneration mandatory requirement is in place, the decision is market driven, meaning that if the productive use in place renders more profits than the revenues from carbon markets, the business-as-usual scenario tends to remain unchanged and vice-versa.[590] In such a case, the above stated socio-economic barriers listed by the CDM Executive Board's guidelines on the selection of a baseline and assessment of additionality must be examined.[591]

i. The Brazilian Forest Constitutional Framework

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[589] *See* Rodrigo Sales & Bruno Kerlakian Sabbag, *Environmental Requirements and Additionality Under the Clean Development Mechanism – A Legal Review Under the UNFCCC, the Kyoto Protocol and the Brazilian Legal Framework on Climate Change*, *in* 2005 YEARBOOK OF THE INTERNATIONAL ENVIRONMENTAL LAW OF OSLO UNIVERSITY 235, 244 (Oxford Press, 2005) ("[W]e are convinced that the CDM must be understood as a compliance promotion tool for the objectives of the convention as well as for domestic policies and legal requirements towards GHG mitigation.").

[590] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 13 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Whereas the private benefits of forest exploitation are valued through the market, social benefits are not valued in the market without some type of policy intervention. Because landowners do not face the full costs of their actions in terms of foregone ecosystem services, they often use resources unsustainably, leading to inefficient allocation of forest resources and the services they provide for greater human well-being. Private landowners behave in these ways because the marginal private benefits of their cleared land (for example, the monetary return from crop cultivation) are not balanced against the marginal costs to society of forest loss (for example, losses of important forest services).").

[591] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19: Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities*, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

Since declaring independence from Portugal in 1822, Brazil has enacted seven constitutions.[592] The last and most recent one was enacted in 1988 right after the re-democratization following the military dictatorship that ran from 1964 to 1985.[593] The term "forest" and/or "flora" were used in previous constitutional texts, although, not within the environmental protection context.[594] Forests, like environmental protection in general, were indirectly treated by previous constitutions within the health protection and legislative jurisdictions' contexts.[595]

With the advent of the 1988 Constitution, the Brazilian "flora" and "forests", along with a whole Chapter solely dedicated to environmental protection, gained constitutional status and protection. This Chapter VI of the Brazilian Constitution explicitly states a Government duty to protect forests and regenerate deforested areas. It recognizes their direct and indirect environmental benefits, properties and features for present and future generations.[596] Article 225 states that "[a]ll have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations.".[597] This article serves as the lens through which all the natural resources' constitutional protective provisions shall be read.

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[592] The Brazilian Constitutions were enacted in chronological order as follow: March 25, 1824; February 24, 1891; July 16, 1934; November 10, 1937; September 18, 1946; January 1, 1967 and October 5, 1988. *See generally* JOSÉ AFONSO DA SILVA, CURSO DE DIREITO CONSTITUCIONAL POSITIVO [POSITIVE CONSTITUTIONAL LAW COURSE] 69-90 (Malheiros Editores 2008) (1976) (BRAZ.) (detailing the political and constitutional history and evolution in Brazil).

[593] *See generally* Marcus Faro de Castro and Maria Izabel Valladao de Carvalho, *Globalization and Recent Political Transitions in Brazil*, 24 INT'L POL. SCI. REV. 465, 467-468 (2003), *available at* http://www.jstor.org/stable/1601633 (detailing the different political cycles in Brazil, including the 1964-85 military dictatorship government, during the 1900s)

[594] *See* TERESA CRISTINA DE DEUS, TUTELA DA FLORA EM FACE DO DIREITO AMBIENTAL BRASILEIRO [PROTECTION OF THE FLORA IN LIGHT OF THE BRAZILIAN ENVIRONMENTAL LAW] 94-96 (Editora Juarez de Oliveira 2003) (2003) (BRAZ.) (providing a historical constitutional overview of the terms "forest" and "flora" in the Brazilian constitutions).

[595] *See* JOSÉ AFONSO DA SILVA, DIREITO AMBIENTAL CONSTITUCIONAL [ENVIRONMENTAL CONSTITUTIONAL LAW] 46 (Malheiros Editores 2007) (1994) (BRAZ.) (stating that out of the most recent constitutions, only the 1946 one contained health protection and legislative jurisdiction provisions which, in turn, inspired a whole set of infra-constitutional environmental protection laws, such as the Forest, Public Health and Water Codes).

[596] *See* JOSÉ AFONSO DA SILVA, DIREITO AMBIENTAL CONSTITUCIONAL [ENVIRONMENTAL CONSTITUTIONAL LAW] 46 (Malheiros Editores 2007) (1994) (BRAZ.) (affirming that the 1988 Brazilian Constitution is an Environmental Constitution, one that deals with environmental matters in a vast and modern way).

[597] Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 225 (1988). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (providing an English version of the Brazilian 1988 Constitution).

This innovative environmental chapter made its way into the 1988 Constitution after a long history of evolving institutional and regulatory framework launched after the 1972 Stockholm Declaration on the Human Environment.[598] Following this landmark international agreement, Brazilian environmental law evolved consistently up until the 1988 Constitution and afterwards[599]. Some paramount pillars of this evolution include the creation of a Special National Secretariat on the Environment in 1973, the 1981 National Environmental Policy Act and the Civil Action Act of 1985 along with other sectoral protective statutes in areas such as liability for damages from nuclear activities and an industrial pollution control act.[600]

Regulatory action in Brazil generated the momentum for the post-military period in 1986 when the then new established democratic government launched the debate over the 1988 Constitution. But the insertion of environmental law into a whole chapter in the Constitution was only effective because of the civil society's pressure upon legislators. This lobby was led by important non-governmental organizations influencing the constitutional decision-making process allowing for the reception of a chapter on environmental law under a title dealing with the Social Order.[601]

With a new constitutional order in place, legislators, public administrators and the civil society as a whole was confronted with the implementation challenge of those general environmental principles broadly stated in the Constitution.[602] In order to promote compliance and enforcement with these provisions, specifically those regarding forest protection and conservation, Chapter VI imposes upon the Government the duty to "define, in all units of the Federation, territorial spaces and their components which are to receive special protection. Any alterations and suppressions being allowed only

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[598] *See generally* PAULO AFFONSO LEME MACHADO, DIREITO AMBIENTAL BRASILEIRO [BRAZILIAN ENVIRONMENTAL LAW] 58-59 (Malheiros Editores 2008) (1982) (BRAZ.) (explaining that the 1972 Stockholm Declaration on the Human Environment influenced the evolution of Brazilian environmental law).

[599] *See generally* Luiz Fernando Henry Sant'Anna, *General Overview of Brazilian Environmental Law*, 15-SPG INT'L L. PRACTICUM 22, 22-23 (2002) (detailing in chronological order the regulatory and institutional framework of Brazilian environmental law).

[600] *See generally* ÉDIS MILARÉ, DIREITO DO AMBIENTE [THE LAW OF THE ENVIRONMENT] 140-142 (Malheiros Editores 2005) (2000) (BRAZ.) (detailing the history of environmental law in Brazil since the 1972 Stockholm Declaration on the Human Environment).

[601] *See* PAULO AFFONSO LEME MACHADO, DIREITO AMBIENTAL BRASILEIRO [BRAZILIAN ENVIRONMENTAL LAW] 122 (Malheiros Editores 2008) (1982) (BRAZ.) (describing how after the indirect election of a civilian president in 1985 and through the lobbying of non-governmental organizations a proposal of an environmental chapter was presented to legislators in charge of the constitutional reform).

[602] *See* Colin Crowford & Guilherme Pignataro, *The Insistent (And Unrelenting) Challenges Of Protecting Biodiversity in Brazil: Finding "The Law That Sticks"*, 39 U. MIAMI INTER-AM. L. REV. 1, 6 (2007) (describing the overall feeling of the Brazilian society "that there is a difference between writing a law and enforcing it. The challenge, Brazilians say, is to write a 'a lei que pega' – 'a law that sticks.'").

by means of law, and any use which may harm the integrity of the attributes which justify their protection being forbidden:"[603]. Even more specifically, article 225, paragraph 1.VII mandates the government to protect "the fauna and the flora, with prohibition, in the manner prescribed by law, of all practices which represent a risk to their ecological function, cause the extinction of species or subject animals to cruelty."[604]. Together with the aforementioned constitutional protection declaring the Atlantic Rainforest a national patrimony,[605] these provisions form the core basis for the Brazilian forest constitutional framework.

However, worthy of noticing is that many constitutional provisions are not self-executing provisions.[606] In article 225, paragraph I.VII stated above, the provision is clear when it uses the term: "in the manner prescribed by law". Therefore, the Constitution often provides general guidance upon the legislature to prescribe more specific commands aiming at implementing the general principles and provisions therein, the so-called, in constitutional law, not self-executing provisions.[607] In this sense, in spite of the Brazilian constitutional forest protection provisions, including those of the Atlantic Rainforest, and considering their dependence upon more specific

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[603] Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 225, par. 4.III (1988). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (providing an English version of the Brazilian 1988 Constitution).

[604] Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 225, par. 4.VII (1988). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (providing an English version of the Brazilian 1988 Constitution).

[605] *See* Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 225, par. 4 (1988) ("The Brazilian Amazonian Forest, the Atlantic Forest, the Serra do Mar, the Pantanal Mato-Grossense and the coastal zone are part of the national patrimony, and they shall be used, as provided by law, under conditions which ensure the preservation of the environment, therein included the use of mineral resources."). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (providing an English version of the Brazilian 1988 Constitution).

[606] On this topic, an analogy can be drawn with the American distinction between "mandatory" and "directory" constitutional provisions. *See generally* Walter F. Dodd, *Judicially Non-Enforcible Provisions of Constitutions*, 80 U. PA. L. REV. 54, 82 (1931) ("If the people in framing a constitution or a constitutional amendment desire to make sure that a provision will be effective without reliance upon action within the uncontrolled discretion of the legislature, they must put the matter into the constitution in such detail and in such form that it becomes self-executing.").

[607] *See* JOSÉ AFONSO DA SILVA, APLICABILIDADE DAS NORMAS CONSTITUCIONAIS [CONSTITUTIONAL NORMS APPLICABILITY] 73 (Malheiros Editores 2007) (2008) (BRAZ.) (categorizing Brazilian constitutional norms into self-executing provisions and not self-executing provisions). For an analogy with self-executing and non-self executing provisions in American constitutional law, *see also* Walter F. Dodd, *Judicially Non-Enforcible Provisions of Constitutions*, 80 U. PA. L. REV. 54, 83 (1931) ("Self-executing provisions are, of course, also limitations [and mandatory limitations] upon the legislature, in that they occupy a field previously occupied by the legislature, and in that the legislature may not run counter to them. Implications against legislative power are easily drawn from such provisions. When the constitution directly legislates it reduces legislative power often to as great an extent as when it directly prohibits or restrict legislative action.").

laws and regulations,[608] they cannot be deemed as national and/or sectoral set of policies capable of influencing the selection of a baseline scenario under the Kyoto Protocol rules.[609] Once again, that is worthy reiterating in light of the CDM Executive Board special requirement of taking into consideration pre-2001 national and/or sectoral policies and circumstances in the establishment of a baseline scenario.[610] On the contrary, assuming those constitutional protective provisions were not dependent upon more specific set of laws and regulations (self-executing provisions), the 1988 Constitution itself could theoretically enjoin a proposed project to pass the aforementioned additionality test imposed for CDM reforestation/afforestation activities by the CDM Executive Board.

But the most important legal analysis of carbon forest markets in light of the Brazilian forest constitutional framework is whether the usage of economic instruments is allowed under the general prohibition to pollute. Antonio Benjamin, a prominent environmental scholar in Brazil and Justice of the Superior Court of Appeals, has noted that "Brazilian legal scholars and judges have stressed the nonexistence of a 'right-to-pollute'. The doctrine consistently rejects the idea that environmental law, through its instruments, can allow the polluter to state 'I pollute, but I pay.'".[611] The rationale is that the constitution features the environment as a diffuse right, meaning that while the right of a healthy environment is one of every Brazilian inhabitant, it also belongs to the collectivity as a whole and that, therefore, cannot be individualized. This makes it a transindividual right impossible to individualize it for every citizen. In turn, this notion converts the right to a healthy environment into an inalienable set of values that cannot

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[608] *See* José Carlos Carvalho, *Policy Initiatives for the Conservation of the Brazilian Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 133, 133 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("The chapter in the constitution devoted to the environment specifically refers to the national heritage of the Atlantic Forest and states that its use, including the use of its natural resources, shall be governed by law under conditions that ensure its preservation.").

[609] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, at 1, U.N. DOC CDM-EB-23 (Feb. 24, 2006) (establishing as a general principle the requirement to take into consideration existing national and/or sectoral policies and circumstances in the definition of a baseline scenario aiming at avoiding perverse negative legislation incentives).

[610] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, at 1, U.N. DOC CDM-EB-23 (Feb. 24, 2006).

[611] Antonio Herman Benjamin & Charles Weiss, Jr., *Economic and Market Incentives as Instruments of Environmental Policy in Brazil and the United States*, 32 TEX. INT'L L. J. 67, 72 (1997).

be measured economically nor can it be tradable by its trustee: the government.[612] With that, a fair interpretation of the Brazilian Constitution would be that an emissions trading scheme could result in a "right-to-pollute" for the buyer of the carbon credit and, hence, be deemed unconstitutional.[613]

Nonetheless, that is not valid for the CDM forestry carbon market or any other emissions trading scheme that is project-based and that generate credits to industrial facilities outside Brazil. Project-based programs, like the CDM of the Kyoto Protocol, is also categorized as baseline-credit system, meaning that polluters with emissions reduction targets to meet, like the ones imposed upon developed countries by the Kyoto Protocol, are allowed to acquire offsetting credits through investment in project-based activities elsewhere. Once a baseline is established for the project and additionality is verified, the difference between emissions without the project and those with the implemented project-activity can be used as emissions credits for compliance with the quantified emissions reduction caps imposed upon developed countries.[614]

Thus, the above described dynamics of the CDM forestry carbon market is not unconstitutional in Brazil, first, because emissions would take place outside the jurisdiction of the Brazilian Constitution and, as a consequence, the constitutionality test of project-based market mechanisms would be void. Second, negotiators at COP-7 carefully inserted the language under "Principles, nature and scope of the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol" clearly stating "that the Kyoto Protocol has not created or bestowed any right, title or entitlement to emissions of any kind on Parties included in Annex I".[615] It is reasonable, therefore, to construe that no

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[612] *See* Antonio Gidi, *Class Action in Brazil – A Model for Civil Law Countries*, 51 AM. J. COMP. L. 311, 351 (2003) ("The concept of a 'transindividual right' [or 'supra-individual right'] merely means that the right is not individual, but exists as an entity distinct from any individual or group of individuals. It transcends the individual and yet it is not a mere collection of individual rights. Therefore, it is legally irrelevant to determine which individuals belong to the group and are, ultimately, the holders of the transindividual right. A 'transindividual' right, such as the purity of the air, the cleanliness of the a river, the truthfulness of advertisements, or the safety of products, belongs to the community as a whole, not to specific individuals, or associations, nor to the government. In economic terms, it consists of a 'public good.' Therefore, this right is situated halfway between public and private law.").

[613] *See* LUIZ GUILHERME MARINONI, TUTELA INIBITÓRIA (INDIVIDUAL E COLETIVA) 94 (Editora Revista dos Tribunais 2006) (1998) (BRAZ.) (writing about the how the possibility of damage recovery within environmental law as opposed to preventive measures could legitimize a right-to-pollute and, therefore, be contrary to the Brazilian constitutional framework).

[614] *See generally* Dennis Hirsch, Andrew Bergman & Michael Heintz, *Emissions Trading – Practical Aspects, in* GLOBAL CLIMATE CHANGE AND U.S. LAW 627, 629-630 (2007) (distinguishing in deeper details the conceptual differences between a baseline-credit and a cap-and-trade market system).

[615] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume II)*, Decision 15/CP.7 pmbl., U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume II)*].

pollution right was conferred or will be bestowed upon developing countries as well. Third, and most importantly, since the Brazilian signature and ratification of the Kyoto Protocol, Brazil incorporated the treaty and its regulations thereof into the country's national legal framework.[616] In other words, by accepting to serve as a hosting country for CDM forestry project-activities under Kyoto regulations, emissions in a developed country thereof is legal under Brazilian law and, therefore, valid under the Brazilian Constitution. And finally, according to Principle 16 of UNCED economic instruments shall be used by national authorities.[617]

On the other hand, with respect to alternative carbon forestry markets taking place solely within Brazil, the constitutional framework also poses no obstacle. First, because in the absence of a domestic mandatory cap on greenhouse gases emissions, there is no constitutional limitation to a company's will to offset its activities by voluntarily deciding to reforest a degraded area, for instance.[618] Second, because no limitation whatsoever can be found in the language of article 225 of the Brazilian Constitution to the use of market-based economic incentives.[619] In the absence of a constitutional prohibition, reference to article 9 of the 1981 National Environmental

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[616] *See* Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 5, ¶ 2° (1988). *See also* The Political Database of the Americas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html ("The rights and guarantees expressed in this Constitution do not exclude others deriving from the regime and from the principles adopted by it, or from the international treaties in which the Federative Republic of Brazil is a party.").

[617] *See* Rio Declaration of the United Nations Conference on Environment and Development ("UNCED"), Principle 16, June 14, 1992, 31 I.L.M. 874, 879 (1992).

[618] Indeed, art. 170. VI of the Brazilian Constitution brings about the concept of sustainable development, conditioning economic development upon the protection of the environment. Additionally, article 186 states that the social function of a property is fulfilled whenever it is inspired by environmental preservation and sustainable natural resources management. Voluntary reforestation/afforestation, preservation and/or conservation measures are aligned with the constitution. *See* Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 170, VII (1988). *See also* The Political Database of the Americas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brtitle7.html.

[619] *See* Antonio Herman Benjamin & Charles Weiss, Jr., *Economic and Market Incentives as Instruments of Environmental Policy in Brazil and the United States*, 32 TEX. INT'L L. J. 67, 72-73 (1997) ("As we have already mentioned, in its chapter on the environment, the 1988 Federal Constitution of Brazil makes no mention of the EMIEP ['Economic and Market Incentives as Instruments of Environmental Policies']. On the contrary, a reading of its detailed text seems to indicate the option of a CAC ['Command-and-Control] system. Expressions such as 'prohibition', 'control', 'punitive and administrative sanctions,' and 'obligation to repair damages' are used liberally. Despite this typical CAC language, no prohibition or general limitation can be drawn on the use of EMIEP. In our opinion, possible restrictions on these instruments would arise more from political, economic, and institutional conditions than from the text of the constitution.").

Policy Act guarantees that economic mechanisms shall be used as instruments of environmental policy in Brazil.[620]

Having concluded that carbon forest markets are both constitutional and legal under the Brazilian legal regime, this study turns in the following sections to the analysis of the forest laws and regulations applicable to the Atlantic Rainforest. Whether there are mandatory reforestation/afforestation provisions in place, the date they were enacted and, most importantly, if they are being complied with or enforced, is crucial for determining if the CDM forestry market can be used at all in light of the CDM forestry baseline and additionality guidelines. Finally, a comprehensive regulatory assessment is essential to drawing a definite conclusion over the effectiveness of carbon forest markets in general for conservation and preservation practices in the Atlantic Rainforest biome.

ii. Federal Forest Legal Framework and Compliance and Enforcement Mechanisms

In a well designed command-and-control system with strong compliance and enforcement tools and institutions, subsidiary economic instruments are, in theory, restricted to a much smaller role, if any at all.[621] Albeit not designed to replace an environmental regulatory regime, market mechanisms can act improving the scope of substantive laws maximizing efficiency of an existing command-and-control system.[622] But for that to happen in the context of the Atlantic forest, identification of flaws and bottlenecks of the existing legal framework is crucial. Within the CDM forestry carbon market context, whether there are laws prior to 2001 imposing mandatory regeneration

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[620] National Environmental Policy Act 6.938/1981 ("Lei da Política Nacional do Meio Ambiente") [PNMA] art. 9º.XIII (1981).

[621] *See* Jürgen Lefevere, *The EU Greenhouse Gas Emission Allowance Trading Scheme*, *in* CLIMATE CHANGE AND CARBON MARKETS 75, 81 (Farhana Yamin ed., 2005) ("Typical command and control legislation functions through a permitting regime, under which a regulated activity is prohibited unless the operator of the activity has a permit. The permit determines the conditions under which the activity is allowed to take place and includes, in particular, limit values for emissions into various aspects of the environment, as well as monitoring and reporting provisions.").

[622] *See* T. H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 1 (2006) ("[T]raditional command-and-control regulatory measures, which depend upon government agencies to define not only the goals but also the means for reaching them, are in many cases insufficiently protective of those resources or economically inefficient.").

of degraded areas and whether they were being complied with or enforced, are of particular importance for the analysis thereof.[623]

Despite historically and unsustainable natural resources exploitation and land use patterns, it was not until recently (late 80's and 90's)[624] that strong and more effective protective constitutional provisions, laws and regulations regarding the Atlantic Rainforest came into force.[625] Currently, many laws and regulations are part of a comprehensive framework designed to protect the last remaining 7.26% of the forest and, to a certain extent, regenerate deforested areas.[626] With the enactment of Law 11.428 in 2006 and Decree 6.660 in 2008, after over five hundred years since the first wave of Europeans settlers, Brazil has put into place a legal framework specifically designed to protect and regulate the sustainable use and exploitation of the Atlantic Rainforest biome.

Along with protective and sustainable development provisions, this Atlantic forest legal regime innovates when takes into consideration the biome's complex socio-economic characteristics due to its vast area and diversity. Consequently, issues regarding traditional communities, small landowners, demographical differences, geographical nuances, population diversity, colonial history and development requirements were all taken into consideration by Law 11.428/2006 and Decree 6.660/2008.[627] Above all, the importance of this Atlantic forest legal framework has direct relationship to whether forest carbon markets can improve the existing command-

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[623] *See* above Chapter 5.b.II.

[624] *See* Ibsen de Gusmão Câmara, *Brief History of Conservation in the Atlantic Forest*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 31, 39 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("The first specific mention of the Atlantic Forest in Brazilian legislation appears in the Federal Constitution of 1988.").

[625] *See* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Mata Atlântica: Avanços Legais e Institucionais Para sua Conservação Doc. 4* [Atlantic Rainforest: Legal and Institutional Evolution Towards Its Protection], Intro. (André R. Lima & João Paulo R. Capobianco orgs., 1997) (1997) *available at* http://www.socioambiental.org/banco_imagens/pdfs/10103.pdf (last visited Jul. 21, 2008) (stressing out that until very recently the only environmental protection law applicable to the Atlantic Rainforest was the general Forest Code from 1965).

[626] *See* João Paulo R. Capobianco, *Situação da Mata Altântica e a Importância de sua Conservação* [Atlantic Rainforest Situation and the Importance of Conserving it], *in* ASPECTOS JURÍDICOS DA PROTEÇÃO DA MATA ATLÂNTICA [JURIDICAL ASPECTS OF THE ATLANTIC RAINFOREST PRESERVATION] 9, 13 (André R. Lima org., 2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/44.pdf (last visited Jul. 22, 2008) (stating that for the first time the Brazilian legislation went beyond merely forest conservation to embrace forest regeneration).

[627] *See* Marga Barth Tessler, *Reflexões Sobre a Tutela Jurídica da Mata Atlântica* [Reflexions About the Atlantic Rainforest Legal Protection], *in* ASPECTOS JURÍDICOS DA PROTEÇÃO DA MATA ATLÂNTICA [JURIDICAL ASPECTS OF THE ATLANTIC RAINFOREST PRESERVATION] 25, 26 (André R. Lima org., 2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/44.pdf (last visited Jul. 22, 2008) (pointing out that one interesting feature of the Decree 750/93 was the fact that it stated what could be done in the Atlantic Rainforest biome, instead of what could not be done. That included the requirements of environmental preservation, but also the needs for economic development).

and-control system. Identifying and understanding the historical evolution of such provisions within the forest's legal framework is a condition to examining degrees of compliance and enforceability of the system capable of influencing the selection of a baseline scenario.

1. The 1965 Forest Code

The 1965 Forest Code[628] is the first law specifically designed and built on the 1934 previous Code[629] to regulate forests in general. This law created two types of protected forest areas, which are of national applicability as long as those areas fit the description prescribed by the norm. The first one is the "Area of Permanent Preservation", described as those areas defined by articles two and three of the Forest Code, covered or not by native vegetation with the environmental role of preserving water resources, aesthetics, geological stability, biodiversity, natural migration and flow of fauna and flora, protect the soil and guarantee the well-being of human populations.[630] Those areas include, for instance, riparian forests, top of mountains, hillsides, dunes, mangroves and other areas declared permanently protect by the government that are of particular environmental importance.[631]

The second type of protected area in the 1965 Forest Code is the "Legal Reserve". This provision translates into an environmental limitation upon private property, imposing the requirement that a portion of the land shall be set uncultivated for the purpose of sustainable use of natural resources, conservation and rehabilitation of ecological processes, biodiversity conservation, habitat and fauna and flora protection.[632] The limitation percentages vary according to the biome where the land is located. In the Atlantic Rainforest biome, a minimum of twenty percent shall remain untouched by landowners. For the purpose of the law, legal reserves cannot count as area of permanent preservation.[633] That means, if a proprietor, for instance, has twenty percent of her/his property falling within the legal description set forth to be an area of

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[628] *See* Law 4,771/1965, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.
[629] *See* Decree 23.793 enacted on January 23rd, 1934 was the first Forest Code in force in Brazil, *available at* http://www.planalto.gov.br/ccivil_03/decreto/1930-1949/D23793.htm.
[630] *See* Law 4,771/1965, art. 1 ¶ 2.II, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.
[631] *See* Law 4,771/1965, arts. 2-3, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.
[632] *See* Law 4,771/1965, art. 1 ¶ 2.III, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.
[633] *See* Law 4,771/1965, art. 16, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.

permanent preservation, necessarily an additional twenty percent of the land will have to be set aside to fulfill the requirement of a legal reserve.[634]

Since the 1965 Forest Code was enacted, different laws and regulations changed and added to the original language of those protective provisions. The main changes were introduced by Law 7,803 of 1989[635] and Executive Provisory Decree 2.166-67 of 24 August 2001.[636] The first altering the riparian limits set forth areas of permanent preservation, mainly, and the later, imposing different percentages of legal reserves per biome and not per region. Within the Atlantic forest's physical and geographical contexts and recalling that over 70% of the Atlantic Rainforest biome is private property,[637] large areas of the region fit the definition of being either areas of permanent preservation or legal reserves.

According to the baseline and additionality guidelines issued by the CDM Executive Board, existing national laws and regulations shall be taken into consideration.[638] Therefore, a preliminary assessment would be enough to assess that those legally protected areas in the Atlantic forest are impeded to benefit from the CDM forestry carbon market, because the Forest Code provisions, including the legal changes thereafter, all predate November 2001. And that is the year from which domestic legislation need not to be taken into account for the selection of a baseline from which additionality is measured.[639]

Assuming that the Forest Code command-and-control regime benefiting vast portions of the Atlantic forest is being consistently enforced and complied with, carbon forest markets, such as the CDM, are needless.[640] But reality is rather a different one.[641]

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[634] *See* Law 4,771/1965, art. 16, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.
[635] *See* Law 7,803/1989, available at http://www.planalto.gov.br/ccivil_03/LEIS/L7803.htm#art2.
[636] *See* Executive Provisory Decree 2,166-67, (2001), *available at* http://www.planalto.gov.br/ccivil_03/MPV/2166-67.htm#art.
[637] *See* Marga Barth Tessller, *Reflexões Sobre a Tutela Jurídica da Mata Atlântica* [Reflexions About the Atlantic Rainforest Legal Protection], *in* ASPECTOS JURÍDICOS DA PROTEÇÃO DA MATA ATLÂNTICA [JURIDICAL ASPECTS OF THE ATLANTIC RAINFOREST PRESERVATION] 25, 25 (André R. Lima org., 2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/44.pdf (last visited Jul. 22, 2008) (stating that approximately 73% of the Atlantic Rainforest fall within private property domain).
[638] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, U.N. DOC CDM-EB-35 (Oct. 19, 2007).
[639] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, U.N. DOC CDM-EB-23 (Feb. 24, 2006).
[640] *See* Carlos Eduardo Frickmann Young, *Socioeconomic Causes of Deforestation in the Atlantic Forest of Brazil*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 103, 113-114 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) (suggesting that although novel protective legislation came into force in the

Moreover, because those protective provisions are quite recent in comparison with the history of the Atlantic Rainforest settlement and natural resources exploitation, by the time they were enacted, the reality was that in most of the private properties within the biome, areas of permanent preservation and legal reserves were already converted into agricultural use.[642] In the absence of precise and comprehensive numbers for degraded portions of those legally protected areas within the Atlantic Rainforest biome, sparse studies and not up-to-date data suggest a trend of non-compliance.[643] Because of that, many landowners and speculators envision the CDM forestry carbon market as a profitable opportunity to bring them into compliance with the areas of permanent preservation and legal reserve requirements.[644]

In support of the abovementioned non-compliance trend, a compilation of official reports and data is quite useful. First, the data presented by the INPE during the 90s showed no significant progress in slowing down deforestation rates of the Atlantic forest.[645] While this data does not specifies different areas, if of permanent preservation, legal reserve or none of them, it constitutes a useful indication of a pattern that had those Forest Code provisions been enforced, it could reflect somehow

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late 90s, positive economic incentives are needed as complementary instruments capable of enhancing the effectiveness of the current command-and-control regime).

[641] *See* Heloísa Orlando, *Implementação da Reserva Legal – Oportunidade Para Expansão da Mata Atlância no Sul da Bahia* [Implementation of the Legal Reserve Area – Oportunity to Expand the Atlantic Rainforest in the South of Bahia], *in* ASPECTOS JURÍDICOS DA PROTEÇÃO DA MATA ATLÂNTICA [JUDICIAL ASPECTS OF THE ATLANTIC RAINFOREST PRESERVATION] 122, 122 (André R. Lima org., 2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/44.pdf (last visited Jul. 22, 2008).

[642] *See* WARWICK MANFRINATO ET AL., THE NATURE CONSERVANCY, ÁREAS DE PRESERVAÇÃO PERMANENTE E RESERVA LEGAL NO CONTEXTO DA MITIGAÇÃO DE MUDANÇAS CLIMÁTICAS – MUDANÇAS CLIMÁTICAS, O CÓDIGO FLORESTAL, O PROTOCOLO DE QUIOTO E O MECANISMO DE DESENVOLVIMENTO LIMPO, 17 (2005), *available at* http://www.celuloseonline.com.br/imagembank/Docs/DocBank/nt5/LivroWarwickManfrinato.pdf (last visited Feb. 26, 2009) (stating that most of the deforestation of the areas of permanent preservation and legal reserve took place prior the enactment of protective legislation).

[643] *See* Carlos Eduardo Frickmann Young, *Socioeconomic Causes of Deforestation in the Atlantic Forest of Brazil*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 103, 104 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("In all, the Atlantic Forest is being pressured by a system that drains its natural resources and is motivated almost completely by short-term thinking and an alarming absence of any value being put on long-term sustainability of land or on the interests of the poor.").

[644] *See* WARWICK MANFRINATO ET AL., THE NATURE CONSERVANCY, ÁREAS DE PRESERVAÇÃO PERMANENTE E RESERVA LEGAL NO CONTEXTO DA MITIGAÇÃO DE MUDANÇAS CLIMÁTICAS – MUDANÇAS CLIMÁTICAS, O CÓDIGO FLORESTAL, O PROTOCOLO DE QUIOTO E O MECANISMO DE DESENVOLVIMENTO LIMPO, 41 (2005), *available at* http://www.celuloseonline.com.br/imagembank/Docs/DocBank/nt5/LivroWarwickManfrinato.pdf (last visited Feb. 26, 2009) (providing a legal opinion supportive of CDM A/R project-activities in areas of permanent preservation and legal reserve in light of the current climate change and Brazilian regulatory framework); *see*

[645] *See* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001*, 24-25 (2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/54.pdf (last visited Jun. 17, 2008) (last visisted Jun. 23, 2008) (showing the high rates of deforestation within the period of 1990-1995).

differently in the INPE report. Second, a report issued by the Nature Conservancy in 2005 reveals a degradation business-as-usual scenario for areas of permanent preservation and legal reserves in spite of protective provisions in place.[646] Third, according to data compiled from the statistical information raised by the National Institute of Colonization and Agrarian Reform ("INCRA"), up until 1998 just a small portion of private properties in Brazil were in compliance with the legal reserve requirement imposed by the Forest Code. The table below shows the percentage of areas within rural private properties in Brazil covered with legal reserves. It reveals that those areas are far from the required twenty percent, especially in those states totally or in part within the Atlantic Rainforest biome (Alagoas, Bahia, Ceará, Espírito Santo, Goiás, Minas Gerais, Mato Grosso do Sul, Paraíba, Pernambuco, Piauí, Paraná, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, Sergipe e São Paulo).[647]

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[646] *See* WARWICK MANFRINATO ET AL., THE NATURE CONSERVANCY, ÁREAS DE PRESERVAÇÃO PERMANENTE E RESERVA LEGAL NO CONTEXTO DA MITIGAÇÃO DE MUDANÇAS CLIMÁTICAS – MUDANÇAS CLIMÁTICAS, O CÓDIGO FLORESTAL, O PROTOCOLO DE QUIOTO E O MECANISMO DE DESENVOLVIMENTO LIMPO, 41 (2005), *available at* http://www.celuloseonline.com.br/imagembank/Docs/DocBank/nt5/LivroWarwickManfrinato.pdf (last visited Feb. 26, 2009) (concluding that although the Forest Code requires afforestation and reforestation of areas of permanent preservation and legal reserves, the law has not been complied nor enforced effectively).

[647] *See* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001* 12 (2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/54.pdf (last visited Jun. 17, 2008) .

Tabela 1: percentagem das áreas dos imóveis rurais do Brasil cobertos com reserva Legal, por Estado.

Estado	1972	1978	1992	1998
	em relação à área de todos os imóveis rurais			
Rondônia	26,84	41,06	10,89	9,36
Acre	19,06	31,54	22,35	15,07
Amazonas	36,30	43,99	9,87	6,37
Roraima	12,40	49,07	1,72	2,99
Pará	29,47	30,65	31,83	24,36
Maranhão	33,70	29,70	20,40	15,91
Amapá	8,31	11,32	8,56	6,79
Piauí	0,96	1,40	2,16	1,95
Ceará	1,28	1,02	0,78	0,59
R.G. do Norte	0,72	0,40	1,91	1,19
Paraíba	1,14	0,93	1,11	0,84
Pernambuco	1,19	1,51	1,33	0,96
Alagoas	1,48	1,51	0,76	0,72
Sergipe	1,19	0,71	1,38	1,79
Bahia	2,55	3,59	3,11	3,26
Minas Gerais	2,69	2,87	5,28	4,92
Espírito Santo	1,51	2,27	1,73	1,20
Rio de Janeiro	6,79	5,49	2,90	2,13
São Paulo	5,59	3,46	2,64	2,70
Paraná	3,69	2,87	3,59	3,55
Santa Catarina	2,67	2,41	2,27	2,16
R.G. do Sul	1,64	0,94	0,57	0,57
Mato Grosso*	16,88	17,19	20,40	18,05
Goiás**	5,77	5,06	6,17	5,76
D. Federal	5,48	5,16	5,88	5,29
Brasil	9,16	12,75	10,31	9,58

Fonte: Estatísticas Cadastrais do INCRA. *Inclui Mato Grosso do Sul. **Inclui Tocantins. As células em branco indicam dados não disponíveis.

Once a non-compliance trend has been identified within those areas protected by the Forest Code, it is important to stress the two different regeneration approaches the law prescribes for areas of permanent preservation and legal reserves. For the prior, no reforestation/afforestation effort is required from the landowner other than just delimitating the area and setting it aside for natural regeneration.[648] For those areas considered legal reserves, a thirty year human-induced regeneration timetable is required by law.[649] In practice, the reasons that make these two approaches important are manifold and examined below.

For legal reserves upon which regeneration is mandatory, although the overall data suggests a non-compliance trend, in which case a reforestation/afforestation project-activity would be additional to the baseline scenario, the available information is over generalist and, therefore, inappropriate to serving the entire Atlantic Rainforest biome. States and municipalities in Brazil enjoy a great deal of power not only on enacting, but also on promoting compliance and enforcement mechanisms with federal environmental laws.[650] Therefore, what seems a non-compliance trend for the country can very well be different from a State and even a municipality-wise reality. The same analogy is valid from a State tendency in comparison to a municipality, for instance. Ultimately, only through a case-by-case analysis that takes into consideration the peculiarities of a region within the Atlantic Rainforest biome can an accurate non-compliance trend be assessed.

The same is applicable to areas of permanent preservation for which no regeneration legal requirement is in place. A general non-compliance trend does not take into consideration different realities throughout this vast biome. But the inexistence of a human-induced regeneration requirement constitutes an important distinctive element in comparison with areas of legal reserve. And that is because the mere requirement of setting the area aside, contrary to what legislators might have thought,

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[648] *See* Executive Provisory Decree 2,166-67, (2001), *available at* http://www.planalto.gov.br/ccivil_03/MPV/2166-67.htm#art (imposing no reforestation/afforestation requirement over area of permanent preservation).

[649] *See* Law 4,771/1965, art. 44, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm.

[650] The 1988 Brazilian Federal Constitution states in its articles 23, 24 and 30.I that the Federal, State and Municipal governments hold the environment in public trust and, consequently, are empowered to administer it jointly and legislate on the topic concurrently. *See* Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.], arts. 23, 24 and 30.I, (1988). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (providing an English version of the Brazilian 1988 Constitution).

does not guarantee that the area will regenerate naturally. If, for instance, the region was taken over by invasive grassland species, it might not be possible for natural recovery, or if so, it could take a long time for that to happen. In those circumstances, human-induced reforestation/afforestation activities can make regeneration feasible or speed up a process that would not occur in the absence of the proposed activity. That was the case of a successful CDM forestry project-activity that took place within the Atlantic Rainforest biome.[651] It is also illustrative of how carbon forest markets can maximize legal regeneration requirements already in place and, consequently, assist on promoting protective environmental laws in the Atlantic forest.

2. Enforcement and Compliance With Federal Environmental Laws and Regulations

Other than those generically applicable Forest Code provisions, additional laws and regulations specific to the Atlantic Rainforest may also influence the legal analysis of how efficient carbon forest markets mechanism are and to what extent they can be fully employed. That is because this specific legal framework brings about protective provisions and compliance and enforcement tools capable of influencing the selection of a baseline and additionality test set forth the CDM rules.[652] Also, because depending on the modality and requirements of alternative carbon forest markets, conservation practices, even when not additional, may benefit from the inflow of offsetting carbon credits.[653]

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[651] *See* Clean Development Mechanism Project Design Document for Reforestation and Afforestation Project-Activities, *AES-Tiete Afforestation/Reforestation Project Activity Around the Borders of Hydroelectric Plant Reservoirs, ARNM0034, 2007*, at 3, U.N. DOC FCCC/SB/2000/XX, Version 3, (Mar. 5, 2007) (describing that although the project boundary region falls within the area of permanent preservation legal requirement, "nearly 100 percent of the areas within the project boundaries were covered with aggressive grass species, which prohibit woody species from taking root, and which, for more than 30 years, have not naturally regenerated.").

[652] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 19: Combined Tool to Identify the Baseline Scenario and Demonstrate Additionality in A/R CDM Project Activities*, U.N. DOC CDM-EB-35 (Oct. 19, 2007); *see* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Oct. 15-19, 2007, *Executive Board of the Clean Development Mechanism Thirty Fifth Meeting Report Annex 17: Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*, U.N. DOC CDM-EB-35 (Oct. 19, 2007).

[653] The Paraná State Environmental Department is stimulating afforestation/reforestation projects in areas of legal reserves enabling small rural landowners to participate in the carbon forest market while promoting compliance and enforcement with the Forest Code protective provisions *See* Agência Estadual de Notícias [State News Agency], *Projeto Paranaense de Sequestro de Carbono Recebe 2ª Premiação em Menos de Um Ano* [State Carbon Sequestration Project Earn 2° Award in Less than One Year], *available at* http://www.aenoticias.pr.gov.br/modules/news/article.php?storyid=36037 (last visited, Feb. 27, 2009).

The 1981 Brazilian National Environmental Policy Act (Law 6,938/81) is the paramount federal statute below the constitutional environmental framework.[654] Its main provisions include: enumerating instruments of environmental policy (e.g. environmental impact assessment, zoning, permitting, etc), establishing strict liability for environmental degradation and promoting a decentralized, yet coordinated management system ("SISNAMA") among different environmental agencies and organs from the federal, state and municipal governments.[655] These provisions form the core basis of environmental law instruments of compliance and enforcement in Brazil. Whether they constitute an effective command-and-control system may impact on the extent carbon forest markets can be useful within the Atlantic forest biome. Reality has demonstrated that although environmental legislation in Brazil is well-designed with strong protective provisions, lack of compliance and enforcement is widespread throughout the country.[656]

In addition to the substantive set of compliance and enforcement legal tools, Law 7,347 of 1985 empowered the Public Prosecutor's Office and Non-Governmental Organizations to bring suits on behalf of environmental protection.[657] Similarly, a citizen suit provision was inserted into the 1988 Constitution[658] improving the strength of a citizen suit statute dated from 1965, Law 4.717.[659] These are all important instrumental enforcement provisions with power to influence the analysis of whether a proposed forestry project-activity would be additional to a scenario without the project.[660] For instance, it is based on the 1985 Civil Action Act that a Public Prosecutor in the State of São Paulo is successfully raising compliance numbers with

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[654] *See* Law 6,938/1981, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L6938.htm.
[655] *See* Law 6,938/1981, arts. 6, 9 and 14 ¶ 1, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L6938.htm.
[656] *See* Colin Crowford & Guilherme Pignataro, *The Insistent (And Unrelenting) Challenges Of Protecting Biodiversity in Brazil: Finding "The Law That Sticks"*, 39 U. MIAMI INTER-AM. L. REV. 1, 6 (2007) (highlighting the overall Brazilian population feeling that written laws lack enforcement and compliance in practice).
[657] *See* Law 7,347/1985, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L7347orig.htm.
[658] *See* Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 5, LXXIII (1988). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (containing an English version of the 1988 Brazilian Constitution) (last visited Jun. 2, 2008).
[659] *See* Law 4,717/1965, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L4717.htm.
[660] *See generally* Lesley K. McAllister, *Public Prosecutors and Environmental Protection in Brazil*, *in* ENVIRONMENTAL ISSUES IN LATIN AMERICA AND THE CARIBBEAN 208 (Aldemaro Romero & Sarah E. West orgs., 2006) ("In Brazil, ... a new type of environmental enforcement – prosecutorial enforcement – is reshaping environmental protection. Both at the federal and state levels, the prosecutors of the Ministério Público have become involved in enforcing environmental laws.").

areas designated as legal reserves by the 1965 Forest Code.[661] In this particular instance, when the command-and-control regime is working properly, the chances a proposed forestry project-activity is additional to a scenario without it, are quite slim.

Administrative and civil sanctions to non-compliance are guaranteed by Law 9,605 of 1998[662] and its regulating Decree 6,514/2008.[663] Through fines and jail time for environmental non-compliance, Law 9,605/1998 is able to improve the degree of enforceability of environmental laws and, therefore, also capable of influencing the additionality test of forestry project-activities under the CDM. Specifically for the Atlantic Rainforest, those who destroy or degrade forested area in its pristine or old secondary or climax stages face one to three years of imprisonment and/or fines.[664] Therefore, if causation can be drawn between administrative fines and criminal prosecution provisions with improvement of compliance and enforcement, it may very well impact on whether the project-activity would be additional to the baseline scenario.

3. Other Relevant Environmental Protective Laws and Regulations

Starting in 1990, soon after the 1988 Constitution was enacted, a set of rules specifically designed to regulate the protection and sustainable use of the Atlantic Rainforest were launched. The first one was Decree 99,547 of 25 September 1990.[665] In light of the constitutional special protection conferred upon the Atlantic forest declaring it common heritage of the Brazilian inhabitants, Decree 99,547 had the task of narrowing down this general provision into more practical and regulatory actions and restrictions upon landowners.[666] This regulation was the first step towards a specific

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[661] *See* Edward Ferreira Filho, Public Prosecutor, São Paulo State Public Prosecutor's Office, *Speech at the 13a Brazilian Environmental Law Conference: Climate Change, Biodiversity and Sustainable Energy Use* (Jun. 5, 2008).
[662] *See* Law 9,605/1998, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L9605.htm.
[663] *See* Decree 6,514/2008, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Decreto/D6514.htm#art153.
[664] *See* Law 9,605/1998, art. 38-A, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L9605.htm.
[665] *See* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001*, 14 (2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/54.pdf (last visited Jun. 17, 2008) (last visisted Jun. 23, 2008) (examining the main provisions of Decree 99,547 of 1990).
[666] *See* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Mata Atlântica: Avanços Legais e Institucionais Para sua Conservação Doc. 4* [Atlantic Rainforest: Legal and Institutional Evolution Towards Its Protection], 9 (André R. Lima & João Paulo R. Capobianco orgs., 1997) (1997) *available at* http://www.socioambiental.org/banco_imagens/pdfs/10103.pdf (last visited Jul. 21, 2008) (stressing that Decree 99,547 was the first Federal Government regulatory initiative with respect to the Constitutional protection conferred upon the Atlantic Rainforest).

legal regime for the Atlantic Rainforest biome and its set of rules were construed around the imposition of a general prohibition to exploit the remaining dense forested areas.[667] But the 1990 Decree was heavily criticized on the grounds that: 1) it did not define the areas comprised by the Atlantic Rainforest biome; 2) in light of its overall ruling forbidding any kind of exploitation of dense forest, it was contrary to the constitutional provision allowing for sustainable exploitation of the biome; 3) it did not create a separate and differentiated regime for local and traditional communities; and 4) it lacked provisions delineating the role of state environmental authorities.[668]

The 1990 Decree was soon replaced by the Decree 750/93[669] which addressed each and every one of those abovementioned criticisms.[670] In 1999, the Brazilian Environmental National Council ("CONAMA")[671], concerned with the lack of a specific federal statute dealing with the Atlantic Rainforest biome and with the stage of the forest degradation, but also recognizing the social and economical needs of the region, agreed upon Resolution 249/1999. This resolution established a detailed Plan of Action for Sustainable Development emphasizing conservation policies regarding the biome and it was a result of a combined effort congregating stakeholders from different sectors.[672] After long years of congressional debate over a proposed legislative bill

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[667] *See* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Mata Atlântica: Avanços Legais e Institucionais Para sua Conservação Doc. 4* [Atlantic Rainforest: Legal and Institutional Evolution Towards Its Protection], 10 (André R. Lima & João Paulo R. Capobianco orgs., 1997) (1997) *available at* http://www.socioambiental.org/banco_imagens/pdfs/10103.pdf (last visited Jul. 21, 2008) (noting that the Decree 99,547 prohibit any kind of forest degeneration or deforestation within the Atlantic Rainforest biome).

[668] *See* Ubiracy Craveiro Araújo, *Mata Atlântica – Do Disciplinamento Jurídico Acerca da Competência Legislativa Para Autorizar a sua Supressão* [Atlantic Rainforest - About the Legal Framework Over Legislative Jurisdiction to Authorize its Suppression], *in* ASPECTOS JURÍDICOS DA PROTEÇÃO DA MATA ATLÂNTICA [JURIDICAL ASPECTS OF THE ATLANTIC RAINFOREST PRESERVATION] 25, 25 (André R. Lima org., 2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/44.pdf (last visited Jul. 22, 2008) (listing the main criticisms to Decree 99,547/90).

[669] *See* Decree 750/1993, *available at* http://www.planalto.gov.br/ccivil_03/decreto/1990-1994/D750.htm.

[670] *See* Marga Barth Tessller, *Reflexões Sobre a Tutela Jurídica da Mata Atlântica* [Reflexions About the Atlantic Rainforest Legal Protection], *in* ASPECTOS JURÍDICOS DA PROTEÇÃO DA MATA ATLÂNTICA [JURIDICAL ASPECTS OF THE ATLANTIC RAINFOREST PRESERVATION] 25, 26 (André R. Lima org., 2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/44.pdf (last visited Jul. 22, 2008) (stressing out that in the Decree 750/93 the lack of more precise provisions in the Decree 99,547 was better structured allowing for an improvement in the protection of the Atlantic Rainforest biome).

[671] *See generally* Luiz Fernando Henry Sant'Anna, *General Overview of Brazilian Environmental Law*, 15-SPG INT'L L. PRACTICUM 22, 22 (2002) ("National Environmental Council or 'CONAMA' [Conselho Nacional do Meio Ambiente] – The main objective of CONAMA, which is the National Council for the Environment, is to deliberate, within the scope of its competence, about rules and standards that are essential to public health and safety and that are compatible with an ecologically balanced environment, and to support, study, and propose to the Ministry of the Environment [...] governmental policy relating to the environment and natural resources.").

[672] *See* Conselho Nacional do Meio Ambiente [Environmental National Council], Resolution 249/1999 [hereinafter CONAMA Resolution], *available at* http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=249.

dealing specifically with the Atlantic Rainforest biome,[673] in 2006 the long wait had come to an end with the passage of Law 11,428/2006[674] and, subsequently, its regulatory Decree 6,660 of 21 November 2008,[675] instituting a definite legal framework specifically designed for the Atlantic Rainforest biome.

Based on this framework legislation, the biome is divided according to different stages of regeneration. Only those areas classified as being in early secondary, old secondary, climax, and pioneer stages of regeneration have their use regulated by the 2006 Law and the 2008 Decree.[676] Areas that are already regularly and legally occupied with agriculture, cities, commercial forest plantations or other deforested areas are left out from the regulatory framework in place. Depending upon the classification of a specific forested area, different degrees of conservation, preservation and sustainable management policies apply.[677] Interestingly, the Atlantic forest law does not impose afforestation/reforestation requirements upon landowners. It simply determines which degeneration and deforestation activities may and may not occur in the Atlantic forest areas classified by the National Environmental Council ("CONAMA") as being in early secondary, old secondary, climax, and pioneer stages of regeneration.[678]

Consequently, if the framework regime does not impose upon landowners the burden of afforestation/reforestation activities *vis-à-vis* to what the 1965 Forest Code mandates for areas falling under the definition of legal reserve; carbon forestry markets could assist maximizing the efficiency of this legal framework in place by serving as an alternative to the degeneration/deforestation business-as-usual scenarios.[679] Furthermore, for the purpose of specifically meeting the CDM forestry project-activities

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[673] *See generally* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Mata Atlântica: Avanços Legais e Institucionais Para sua Conservação Doc. 4* [Atlantic Rainforest: Legal and Institutional Evolution Towards Its Protection], Intro. (André R. Lima & João Paulo R. Capobianco orgs., 1997) (1997) *available at* http://www.socioambiental.org/banco_imagens/pdfs/10103.pdf (last visited Jul. 21, 2008) (presenting detailed information on the proposed legislative bill number 3,285/92).

[674] *See* Law 11,428/2006, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11428.htm.

[675] *See* Decree 6,660/2008, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Decreto/D6660.htm.

[676] *See* Law 11,428/2006, art. 2 ¶, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11428.htm.

[677] The technical parameters for defining the regeneration stages of areas within the Atlantic Rainforest biome are set forth by CONAMA resolutions. *See* Conselho Nacional do Meio Ambiente [Environmental National Council], Resolutions 10 and 11 of 1993, 1, 2, 4, 5, 6, 12, 25, 26, 28, 29, 30, 31, 32, 33 and 34 of 1994, 7 of 1996, 261 of 1999, and 388, 391 and 392 of 2007 *available at* http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=249.

[678] *See* Law 11,428/2006, arts. 20-32, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11428.htm.

[679] *See* above chapter 5.b.III.

guidelines, it is worth noticing that this new Atlantic Rainforest legislative framework came into force five years after the November 2001 baseline year.[680] In other words, this set of national policies instituted by law and regulation need not to be taken into account for the selection of a baseline from which additionality is measured.[681] Ultimately, that reveals the CDM forestry carbon market did not constitute a perverse incentive holding back domestic legislators from enacting protective forestry provisions.[682]

Additionally, the 2008 Decree 6,660 in its article 46 – regulating articles 33-35 of Law 11,428/2006[683] - states that afforestation projects within the Atlantic Rainforest, including those taking place on areas of permanent preservation and legal reserve under the 1965 Forest Code are eligible to receive economic incentives.[684] These incentives can be either domestically stated in national legislation as well as those from multilateral environmental agreements related to biodiversity, forests and, more importantly, climate change.[685] Regeneration projects in areas of permanent preservation and legal reserves are expressly stated as eligible to receiving economic incentives in spite of the above mentioned command-and-control regime put into place by the 1965 Forest Code provisions.[686] Assuming a proposed project activity can overcome the additionality technicality from the selection of a baseline scenario that considers the current Forest Code in place,[687] article 46 of Decree 6,660 is a clear indication to the Brazilian DNA that CDM forestry project activities aimed at regenerating the Atlantic Rainforest meets the country's sustainable development goals in light of the current legal framework.[688] Moreover, this economic policy provision

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[680] *See* above chapter 5.b.III.
[681] *See* above chapter 5.b.III.
[682] *See* Meeting of the Executive Board of the Clean Development Mechanism, Bonn, F.R.G., Feb. 22-24, 2006, *Executive Board of the Clean Development Mechanism Twenty Third Meeting Report Annex 19: National and/or Sectoral Policies and Circumstances in the Baseline Scenario for Afforestation and Reforestation Project Activities*, ¶ 3, U.N. DOC CDM-EB-23 (Feb. 24, 2006).
[683] *See* Law 11,428/2006, arts. 33-35, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11428.htm.
[684] *See* Decree 6,660/2008, art. 46, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Decreto/D6660.htm .
[685] *See* Decree 6,660/2008, art. 46, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Decreto/D6660.htm.
[686] *See* Decree 6,660/2008, art. 46, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Decreto/D6660.htm.
[687] *See* above chapter 5.b.III.
[688] According to Decision 17/CP.7 is the host country Party's prerogative to assess whether a CDM project meets its sustainable development goals. *See See* Conference of the Parties to the United Nations Framework Convention on Climate Change, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume*

instituted by law is capable of stimulating forestry activities under the voluntary market with less stringent set of regulations at least for areas or permanent preservation and legal reserves falling within the Atlantic Rainforest biome.

Finally, with respect to protective provisions imposed upon landowners with property undergoing some of the aforementioned stages of regeneration, alternative carbon markets that do not have strict additionality requirements may assist on maximizing implementation efficiency of the Atlantic Rainforest legal framework.[689] This could shift investment options from developing a forested region undergoing a regeneration process to conservation activities.[690] Tradable carbon credits from an avoided deforestation project, in that case, could constitute an attractive option for a forested area under development pressure. Moreover, developers would study alternative development options even if more costly in light of the potential revenue loss of developing an area that could profit from an avoided deforestation project.

4. Laws 9,985 of 2000 and 11,284 of 2006

Two other forest laws of relevance to the Atlantic Rainforest biome are Laws 9,985 of 2000[691] and 11,284 of 2006.[692] Although not specifically designed to the Atlantic forest, both laws reflect somehow the Brazilian approach to market mechanisms as instruments of environmental policy. These laws do not forbid project forestry-activities. To the contrary, Law 11,284 adds to article 9 of the 1981 National Environmental Policy Act economic mechanisms as an additional instrument of environmental policy.[693]

II), Decision 17/CP.7, pmbl., U.N. DOC FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter *COP-7 Report – Part Two (Volume II)*].

[689] *See* Katherine Hamilton et al., *Carving a Niche for Forests in the Voluntary Carbon Markets, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 292, 294 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Unfortunately, the regulated market's regulatory requirements have created high cost and time barriers that exclude many project developers from entering the markets.").

[690] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 14 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("In contrast to nonmarket approaches to forest conservation, market-based mechanisms encourage a particular behavior by changing the incentives for individual agents.").

[691] *See* Law 9,985/2000, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L9985.htm.

[692] *See* Law 11,284/2006, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11284.htm.

[693] *See* Law 6,938/1981, art. 9.XIII, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L6938.htm.

Starting with Law 9,985/2000, it instituted in Brazil the National System of Conservation Units ("SNUC"). The SNUC divides conservation units into two different categories: 1) complete protection; and 2) sustainable development.[694] Under each of these categories, specific units are defined. The differences between them is that on those units defined as being of complete protection, only activities that do not involve consumption, extractive practices, damage or destruction of natural resources are authorized. For sustainable development units, the direct use is authorized, meaning those involving sustainable natural resources exploitation for commercial purpose or not.[695]

Those conservation units defined by law as of complete protection are: 1) Ecologic Stations; 2) Biologic Reserves; 3) National Parks; 4) Natural Monuments; and 5) Wildlife Refuges.[696] In contrast, those under the sustainable development category are: 1) Environmental Protection Area; 2) Area of Relevant Environmental Interest; 3) National Forests; 4) Extractive Reserves; 5) Fauna Reserve; 6) Sustainable Development Reserve; and 7) Private Reserve of Natural Patrimony.[697] Due to the way some of those units are designed and conceptualized, carbon forest markets are irrelevant or of no applicability whatsoever. On the other hand, considering the format some of these units take, carbon forest markets can constitute important and additional regeneration and preservation incentives.

For forest carbon markets allowing credits for avoided deforestation and that do not have strict additionality requirements, in principle all of conservation units of complete protection could potentially benefit. Because all of those units value existing native natural areas, which often comprises primary forested areas with high ecological value associated to it, carbon markets allowing for avoided deforestation could stimulate the conception of new units and special maintenance treatment of existing ones.[698] This market for forested areas of high ecological value would assist on

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[694] *See* Law 9,985/2000, art. 7.I and II, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L9985.htm.
[695] *See generally* Colin Crowford & Guilherme Pignataro, *The Insistent (And Unrelenting) Challenges Of Protecting Biodiversity in Brazil: Finding "The Law That Sticks"*, 39 U. MIAMI INTER-AM. L. REV. 1, 30-65 (2007) (examining in details Law 9,985 of 2000).
[696] *See* Law 9,985/2000, art. 8.I-V, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L9985.htm.
[697] *See* Law 9,985/2000, art. 14.I-VII, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L9985.htm.
[698] *See* Marisa Meizlish and David Brand, *Developing Forestry Carbon Projects for the Voluntary Carbon Market: A Practical Analysis*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 311, 313 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Conservation, or avoided deforestation, projects prevent forests from being converted to nonforest land uses. Carbon credits are created by accounting for the existing volume of carbon sequestered in the forest. In order to claim the carbon associated with emission reductions,

attracting foreign funding for conservation projects. Depending on how successful this market turns out for existing forested areas, it would also work as an additional incentive to regenerate degraded areas that once were of high ecological value. After regenerated, the conservation unit could benefit from carbon credits. In that case, credits could also be generated from the afforestation/reforestation project prior to becoming an area of complete protection.[699]

With respect to conservation units of sustainable development, considering natural resources exploitation are allowed in a balance between social and economic needs and environmental protection, carbon forest credits can assist on maximizing the means to achieving regeneration and preservation objectives set forth the SNUC. Areas named extractive and sustainable development reserves are linked to the living and subsistence needs of traditional populations. Fauna reserve, area of relevant environmental interest and environmental protection area have well defined objectives, such as protection of animal habitats, rare locally occurring biota and urban environments respectively.[700] For all of these five types of special conservation units, while carbon credits could be theoretically generated for their forested areas under carbon markets, because they are limited in scope and with well defined objectives far from climate change mitigation, a realistic analysis suggests little, if any, positive carbon market influence on these types of units worthy of further investigation in this study. That, however, does not undermine economic market-based incentives for different ecosystem services.[701] In addition, public subsidies through tax incentives and

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avoided deforestation projects need to establish that an immediate conversion threat exists and demonstrate that carbon revenues are essential to conserving forest.").

[699] *See generally* Marisa Meizlish and David Brand, *Developing Forestry Carbon Projects for the Voluntary Carbon Market: A Practical Analysis*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 311, 314 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Concurrent with the growing interest in the carbon value of forest is a recent upsurge of private investment in the forestry sector. The vast amount of capital invested in timber production is likely to play an important part in enhancing the role of carbon sequestration in both voluntary and regulatory markets, as investors look to maximize returns. It is also likely that forestry project focused on conservation or noncommercial uses will incorporate sustainable harvesting in the future, because the value of standing forests needs to compete with economic drivers that are rapidly converting forests to agribusiness plantations.").

[700] *See generally* Colin Crowford & Guilherme Pignataro, *The Insistent (And Unrelenting) Challenges Of Protecting Biodiversity in Brazil: Finding "The Law That Sticks"*, 39 U. MIAMI INTER-AM. L. REV. 1, 40-50 (2007) (providing a detailed examination of each of the above listed types of conservation units under the SNUC law).

[701] *See* Marisa Meizlish and David Brand, *Developing Forestry Carbon Projects for the Voluntary Carbon Market: A Practical Analysis*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 311, 313 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("There are now emerging market values for a range of ecosystem services

compensation tend to be more effective on promoting these special sustainable development units.[702]

On the flip side, that is not the case for private reserves of natural patrimony and areas defined as national forests.[703] For the prior, a landowner's initiative may impose upon her/his own land a conservation easement registered with the State and that sticks to the property in perpetuity. For large forested areas following under private property, the possibility of carbon credits from avoided deforestation can serve as an effective incentive for landowners to transform their lands into private reserves of natural patrimony. Currently, those areas in Brazil are already incentivized by economic mechanisms such as tax breaks and subsidies.[704]

Within the concept of national forests, Law 11,284/2006's main objective is to protect areas covered with native species allowing for sustainable exploitation of forest resources. That is done through a governmental grant process through which private parties are granted special exploitation licenses to exploit public forests.[705] Contrary to the abovementioned modalities of special conservation units from which carbon credit opportunities are assumed based on general market conceptual rules, Law 11,284/2006 expressly regulates potential revenues from carbon forest markets deriving from any given grant.[706]

Article 16 of Law 11,284/2006 expressly forbids the commercialization of carbon credits deriving from avoided deforestation projects on national forests under

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including water purification, nutrient retention, and biodiversity conservation, not just the value of timber.").

[702] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 16-20 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008). (providing a table listing different economic incentives for different types of forest conservation projects and units).

[703] *See* Colin Crowford & Guilherme Pignataro, *The Insistent (And Unrelenting) Challenges Of Protecting Biodiversity in Brazil: Finding "The Law That Sticks"*, 39 U. MIAMI INTER-AM. L. REV. 1, 43, 49 (2007) (defining private reserves of natural patrimony as "privately-owned land that is designated for perpetual use as a property in which biological diversity will be preserved."; and national forests as an attempt to "protect areas with forest cover with a predominance of 'native species',. . . .".).

[704] *See* Rosimeiry Portela et al., *The Idea of Market-Based Mechanisms for Forest Conservation and Climate Change*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 11, 19 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (describing the economic mechanism applicable to the Brazilian private natural patrimony reserves as a "system in which landowners can designate private property as conservation areas to protect biodiversity in perpetuity, in exchange for rural property tax exemptions, preference in the state concession of rural credits, and cooperation with private and public entities in the protection, management, and handling of the RPPN.").

[705] *See* Law 11,284/2006, arts. 7-9, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11284.htm.

[706] *See* Law 11,284/2006, art. 16.IV ¶ 2°, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11284.htm.

private concession.[707] At the same time, the law authorizes grant proposals to include commercialization rights over carbon credits from afforestation/reforestation projects.[708] On this topic, domestic legislators sent a clear message to the international community that for the post-2012 commitment period, Brazil is not willing to accept avoided deforestation projects on national forests designed for sustainable exploitation.[709] While such legislative intent is of little applicability to the Atlantic Rainforest, considering its high stage of degradation,[710] it is of relevance to the Amazon forest and of importance to this study because Law 11,284/2006 is the first statute expressly referring to market-based forestry incentive.

However, considering that Brazilian legislators clearly intended that national forests were to be multiply and sustainably exploited,[711] setting a forested area aside for the pursue of avoided deforestation carbon credits does not fulfill the national forests' legally established basic objective. In that sense, for forested areas declared national forests and under a public concession, no credits from REDD might be sought. If not for REDD activities, the national forests' Act still is a landmark statute for market-based forestry economic incentive as it constitutes the first specific legislative action expressly embracing afforestation/reforestation projects.[712] And because of that, even though of limited applicability to the Atlantic forest, it can be seen as an important step in broadening legislative receptivity of this type of economic mechanism.

In addition, official data reports over seven hundred conservation units within the Atlantic forest including those of complete protection and of sustainable use.[713]

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[707] *See* Law 11,284/2006, art. 16.IV, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11284.htm.

[708] *See* Law 11,284/2006, art. 16. ¶ 2°, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11284.htm.

[709] *See Summary of the Thirteenth Conference of Parties to the UN Framework Convention on Climate Change and Third Meeting of Parties to the Kyoto Protocol*, EARTH NEGOTIATIONS BULL., Dec. 18, 2007, at 7, *available at* http://www.iisd.ca/download/pdf/enb12354e.pdf (highlighting Brazil's opposition to accept reducing emissions from deforestation in developing countries).

[710] Both statutes were designed with a conservationist purpose aimed at protecting existing forests. Since most of the last remaining forested areas in Brazil are on the Amazon biome and very few left on the Atlantic Rainforest region, the prior is likely to benefit to a much greater extent from both laws' positive effects. *See* above chapter 6.

[711] *See* Law 9,985/2000, art. 17, *available at* http://www.planalto.gov.br/ccivil_03/Leis/L9985.htm.

[712] *See* Law 11,284/2006, art. 16 ¶ 2°, *available at* http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11284.htm.

[713] *See* Instituto Socioambiental (Social-Environmental Institute) [ISA], *Dossiê Mata Atlântica 2001*, 31 (2001) *available at* http://www.socioambiental.org/banco_imagens/pdfs/54.pdf (last visited Jun. 17, 2008) (listing conservation units of complete protection and sustainable use withing the Atlantic Rainforest biome).

Albeit limited in scope,[714] some of these areas are already benefiting from the voluntary carbon forest market.[715] Yet, "[p]rotected areas cover less than 2 percent of the original Brazilian Forest biome, and strictly protected units currently protect only 21 percent of remnant forests."[716] Because within voluntary markets no limitation to avoided deforestation activities exists, they are illustrative of how economic instruments can maximize preservation and conservation efforts of the last remaining primary Atlantic forested areas.[717] Whenever voluntary carbon markets are accompanied by sustainability standards, in addition to promoting climate change mitigation they can assist on raising the region's environmental standards by valuing different ecosystem services.[718]

Finally, because under the 2000 SNUC Law no mandatory afforestation/reforestation is required, it does not influence the selection of a baseline scenario from which additionality is measured under the CDM. Thus, it does not carry the burden of enjoining forestry project-activities within markets with stricter additionality rules.[719] With respect to the abovementioned carbon credits provisions set forth the 2006 National Forest Act, because no comparative afforestation/reforestation advantage competes with the Kyoto's forestry market and due to the fact the law

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[714] *See* Carlos Galindo-Leal and Ibsen de Gusmão Câmara, *Atlantic Forest Hotspot Status: An Overview*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 3, 8 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("[I]t is difficult to assess the actual protection afforded by these protected areas because many of them lack the basis apparatus necessary to effectively maintain biodiversity, tools such as management plans, land tenure definition, plant and animal inventories, monitoring, and law enforcement. Although a few parks do have effective management mechanisms in place, most are only paper parks. In addition, many protected areas were created opportunistically, and their size, shape, and zoning may not be the most effective for focused conservation pourposes.").

[715] *See* Projetos Seqüestro de Carbono – Projetos de Ação Contra o Aquecimento Global [Carbon Sequestration Projects – Action Projects Against Global Warming], *available at* http://www.spvs.org.br/projetos/sdc_index.php (last visited 6 Feb. 2009) (describing a joint sequestration project in the Atlantic Rainforest between SPVS [an Atlantic Rainforest-based NGO] and The Nature Conservancy in partnership with American Electric Power, General Motors and Chevron).

[716] Luiz Paulo Pinto and Maria Cecília Wey de Brito, *Dynamics of Biodiversity Loss in the Brazilian Atlantic Forest: An Introduction*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 27, 28 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003)

[717] An example of voluntary initiatives aimed at promoting conservation and regeneration practices is the Monte Pascoal carbon forest project on the Atlantic Rainforest in the State of Bahia. *See* The Climate, Community & Biodiversity Alliance ("CCB"), *The Monte Pascoal – Pau Brasil Ecological Corridor: Carbon, Community and Biodiversity Initiative – Monte Pascoal Farm – CPA#1*, 7, *available at* http://www.climate-standards.org/projects/files/cpa_dd_caraiva.pdf (last visited 31 Mar., 2009).

[718] *See generally* Katherine Hamilton et al., *Carving a Niche for Forests in the Voluntary Carbon Markets*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 292, 297-304 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) (listing different standardization initiatives provided by independent organizations and programs incorporating concepts of sustainable development).

[719] *See* above chapter 5.b.III.

outdates the 2001 baseline year set forth the CDM forestry guidelines, it does not need to be taken into consideration in the selection of a baseline scenario.[720]

7. Overcoming the Obstacles to, and Adverse Impacts of, Carbon Forest Markets for the Brazilian Atlantic Rainforest

In general, if well-managed and implemented, project-based forestry market incentives can serve many environmental, social and economic purposes and benefit small, rural, and poor communities and individuals. The positive aspects of forestry activities can overcome political, legal, and technical challenges; the risks to biodiversity, watersheds and of deforestation. This section, then, is dedicated to examining trends and proposing concrete policy actions capable of fostering a carbon forest market and thus contributing for the regeneration and preservation of the Atlantic Rainforest biome.

a. Overcoming Political Obstacles

Under the regulatory market set forth the Kyoto Protocol, political obstacles are a major barrier for further expansion of the current carbon forest market. The U.S. for what it represents in any international environmental negotiation and considering the country was among those advocating an ample use of forestry activities during the Kyoto negotiations is a key player to foster the regulated carbon forest market.[721] By ratifying the Kyoto Protocol, it is likely that the U.S. will enhance the demand for carbon forest credits and thus assist on fostering the market for conservation and regeneration practices worldwide. In the voluntary market, North-American enterprises pioneered and are currently major consumers of voluntary emission reductions credits in the forestry sector.

Furthermore, in the 2006 elections in the United States the Democrats took the majority from the Republican Party in Congress. In 2008 the Democrat presidential candidate, Barack Hussein Obama, was elected. In view of Democratic sensibilities with respect to climate change, and the fact that the Clinton Administration signed the

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[720] *See* above chapter 5.b.III.
[721] *See* above Chapter 4.

Kyoto Protocol but faced a Republican Congress, one could hope a more active American role and involvement in the international climate change regime.[722]

On the flip side, the European Union as another major player in the international climate change regime is not demonstrating willingness to expand allowable forestry activities under the Kyoto regulated market. Two factors indicate that the EU will not easily accept forestry activities in the CDM in future commitment periods. The EU's refusal to accept credits from forestry activities in the EU ETS is the first clear indication.[723] In addition, should the afforestation and reforestation limitation be overcome in the CDM for future commitment periods, the language used in the ETS suggests that it is not likely that the EU will accept the expansion of allowable activities.[724] Instead of using just the terms afforestation and reforestation in the ETS, legislators used the phrase LULUCF,[725] which could suggest that the EU anticipated future attempts to broaden the scope of forestry projects in the CDM and opted to exclude all forestry projects in advance.

Prospects are better off for the CDM's current limitation on forestry activities to afforestation and reforestation projects. Decision 11/CP.7 provides that the limitation is valid for only the first commitment period and that the Parties should decide upon new LULUCF activities for upcoming commitment periods.[726] The inclusion of REDD activities in the Bali Roadmap is indicative that forestry activities will be expand

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[722] *See* JOHN R. JUSTUS & SUSAN R. FLETCHER, CONG. RESEARCH SERV., CRS ISSUE BRIEF FOR CONGRESS: GLOBAL CLIMATE CHANGE 11 (2004) (implying that, contrary to the Bush administration, the Clinton administration demonstrated an affinity towards the international climate change legal regime.).

[723] *See* KENNETH M. CHOMITZ ET AL., WORLD BANK, OVERVIEW: AT LOGGERHEADS? AGRICULTURAL EXPANSION, POVERTY REDUCTION, AND ENVIRONMENT IN THE TROPICAL FORESTS 23 (2007), *available at* http://siteresources.worldbank.org/INTTROPICALFOREST/Resources/2463822-1161184206155/3060670-1161608416166/PRR-AL_SAOverviewwebnonembargo.pdf ("[S]ome observers think that tackling climate change requires paying about US$3 a ton for CO2 abatement – and European Union (EU) members are currently paying up to US$20 a ton (though this price is volatile). In other words, deforesters are destroying a carbon storage asset theoretically worth US$1,500-US$10,000 to create a pasture worth US$200-US$500 (per hectare). Yet carbon markets, such as those under the Kyoto Protocol and EU Emissions Trading Scheme, do not reward forestholders for reduced emissions from avoided deforestation.").

[724] *See* Imke Sagemüller, *Forest Sinks Under the United Nations Framework Convention on Climate Change and the Kyoto Protocol: Opportunity or Risk for Biodiversity?*, 31 COLUM. J. ENVTL. L. 189, 233 (2006) (noting that EU's decision not to recognize credits for LULUCF activities is premised on the fact that forestry credits can be obtained at relatively low prices, reducing emissions allowances prices and inhibiting domestic action aimed at curbing greenhouse gas emissions).

[725] *See* Council Directive No. 2004/101/EC, art. 1, 2004 O.J. L 338, at 18, 21.

[726] *See* Conference of the Parties to the Kyoto Protocol, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the Parties on its Seventh Session – Part Two: Action Taken by the Conference of the Parties (Volume I)*, Decision 11/CP.7 Annex, ¶ 14-15, U.N. DOC FCCC/CP/2001/13/Add.1 (Jan. 21, 2002) [hereinafter] *COP-7 Report – Part Two (Volume I)*].

beyond just afforestation/reforestation practices.[727] While the Parties do not reach an agreement upon the rules governing the post-2012 period, the voluntary market grows in importance. In that sense, addressing the lack of reliable data, the fragmentation of the market, developing efficient registry schemes and standardization patterns is crucial to boost the voluntary market to the point it can be more readily used within the Atlantic Rainforest biome.

b. A Stronger Link Between the Climate Change Legal Regime and Other Major Multilateral Environmental Agreements

As far as CDM forestry activities are concerned, in light of environmental, social, and political implications arising internationally from the climate change debate, it is crucial that the legal regime creates links beyond those envisioned between the Liaison Group and the Rio Conventions.[728] The design of carbon forest projects can improve regional socio-economic standards and foster other ecosystem services beyond climate change mitigation.[729] Therefore, following the example set by the FAO,[730] stronger communications channels ought to be opened with the World Bank, and the International Labor Organization on the potential implications and benefits of forestry activities on employment conditions and opportunities.[731]

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[727] *See* Conference of the Parties to the United Nations Convention on Climate Change, Bali, Indonesia, Dec. 3-15, 2007, *Report of the Conference of the Parties on its Thirteenth Session – Part Two: Action Taken by the Conference of the Parties at its Thirteenth Session,* Decision 1/CP.13, U.N. DOC. FCCC/CP/2007/6/Add.1 (Mar. 14, 2008) [hereinafter *COP-13 Report – Part Two*].

[728] *See* Conference of the Parties to the Kyoto Protocol, New Delhi, India, Oct. 23-Nov. 1, 2002, *Report of the Conference of the Parties on its Eighth Session – Part Two: Action Taken by the Conference of the Parties at its Eighth Session,* Decision 13/CP.8, ¶ 1, U.N. DOC FCCC/CP/2002/7/Add.1 (Mar. 28, 2003) (affirming the need for enhanced cooperation between the UNFCCC, the Convention on Biological Diversity, and the Convention to Combat Desertification).

[729] *See* Jan Fehse, *Forest Carbon and Other Ecosystem Services: Synergies Between the Rio Conventions, in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 59, 59 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Depending on their design, most carbon forestry projects provide one or more additional services that benefit the local, regional, and in some cases global community. In doing so they can also contribute to the objectives of the United National Millennium Declaration and of two United Nations Rio Conventions, the Convention to Combat Desertification (CCD) and the Convention on Biodiversity (CBD).").

[730] *See* KENNETH L. ROSENBAUN ET AL., FOOD & AGRIGULTURE ORGANIZATION OF THE U.N., CLIMATE CHANGE AND THE FOREST FACTORS: POSSIBLE NATIONAL AND SUBNATIONAL LEGISLATION 31 (2004), *available at* ftp://ftp.fao.org/docrep/fao/007/y5647e/y5647e00.pdf (taking into consideration the benefits and pitfalls of markets as tools for the encouragement of mitigation activities).

[731] *See* Seventh Session of the Subsidiary Body for Scientific and Technological Advice, Bonn, F.R.G., October 20-29, 1997, *Activities Implemented Jointly Under the Pilot Phase: Synthesis Report on Activities Implemented Jointly – Note by the Secretariat,* ¶ 28, U.N. DOC FCCC/SBSTA/1997/12 (Oct. 7, 1997) [hereinafter *1997 SBSTA Report*] (listing improved working environments, increased economic

The Secretariat of the Convention on Biological Diversity has also provided a paradigm to be followed in the socio-economic area by developing a specific study on the relationship between biological diversity and climate change.[732] Firmer institutional cooperation beyond interconnected environmental areas would help prevent poor social conditions, such as the ones threatening the credibility of CDM biofuels and biomass project activities.[733]

Such links and interconnection would be similar to the ecological standards under voluntary markets, recognizing that the benefits of forest market incentives go beyond climate change mitigation. Considering the Atlantic Rainforest region congregates one of the world's highest rates of biodiversity, along with various socio-economic challenges, a regulated forestry market with standards beyond climate change mitigation could provide an additional range of socio-economic and environmental benefits.[734] In light of the above highlighted Atlantic forest's ecological and socio-economical characteristics, a regulated forestry market with broader standards tends to be more promising for the Atlantic Rainforest biome than the current one under the Kyoto Protocol.[735]

c. Environmental and Socio-Economic Impact Analyses, Assessments and Standards

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opportunities, and the development of local production capacity as potential benefits arising from jointly implemented activities).

[732] *See* SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY, INTERLINKAGES BETWEEN BIOLOGICAL DIVERSITY AND CLIMATE CHANGE: ADVICE ON THE INTEGRATION OF BIODIVERSITY CONSIDERATIONS INTO THE IMPLEMENTATION OF THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND ITS KYOTO PROTOCOL 48 (2003), *available at* http://www.biodiv.org/doc/publications/cbd-ts-10.pdf.

[733] *See* Press Release, Inter-Am. Dev. Bank, IDB Targets $3 Billion in Private Sector Biofuel Projects (Apr. 2, 2007), *available at* http://www.iadb.org/NEWS/articledetail.cfm?artid=3779&language=En (announcing investments in ethanol and biofuels production while closely examining questions regarding labor conditions).

[734] *See* Jan Fehse, *Forest Carbon and Other Ecosystem Services: Synergies Between the Rio Conventions*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 59, 67 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("Forest conservation is a holistic approach from the point of view of ecosystem services. Preventing deforestation of an area conserves the whole set of ecosystem services the forest offers.").

[735] Robert O'Sullivan, *Reducing Emissions from Deforestation in Developing Countries: An Introduction*, *in* CLIMATE CHANGE AND FORESTS – EMERGING POLICY AND MARKET OPPORTUNITIES 179, 182 (Charlotte Streck, Robert O'Sullivan, Toby Janson-Smith, and Richard Tarasofsky eds., 2008) ("The treatment of afforestation and reforestation under the CDM and the EU Emissions Trading Scheme is an example of the way overcomplex and discriminatory rules have led to a market failure in this sector.").

The importance of environmental and socio-economic impact assessments is doubltless. Nonetheless, two major factors appear to limit the power of climate change negotiators to go beyond merely requiring preliminary analysis instead of an impact assessment. The first one is a legal limitation. Article 21 of the 1972 Declaration of the United Nations Conference on the Human Environment ("UNCHE") clearly states that countries have the sovereign right to exploit their own natural resources pursuant to their own environmental policies.[736] In addition, Principle 17 of UNCED, while embracing environmental impact assessments, establishes that they shall be conducted only when the proposed activity is likely to adversely impact the environment.[737]

The second factor seems to be of a policy nature. That is, the whole validation, verification, and certification process for afforestation and reforestation projects is already overly burdensome, bureaucratic, time consuming, and replete with high procedural costs. Adding an environmental and social-economic impact assessment for those projects that, at first, do not present the risk for any adverse impacts would make CDM forestry activities practically unfeasible in light of the aforementioned legal, political, and technical obstacles already apparent.[738]

The same rationale is applicable to voluntary markets. If an environmental and socio-economic impact assessment was required regardless whether a preliminary analysis demonstrated that little if any probable adverse impact, it would constitute an additional unnecessary burden. In that sense, the development of ecological and socio-economic standards is more effective on ensuring positive effects from a proposed forestry-activity than a mandatory impact assessment.

Under the Brazilian environmental legal framework, article 225.IV of the 1988 Brazilian Constitution states that an impact assessment is necessary for any activity

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[736] *See* United Nations Conference on the Human Environment, Stockholm, Swed., June 5-16, 1972, *Declaration of the United Nations Conference on the Human Environment,* Principle 21, U.N. DOC A/Conf.48/14/Rev.1 (June 16, 1972) ("States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies . . . .").

[737] *See* United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3-14, 1992, *Rio Declaration on Environment and Development*, Principle 17, U.N. DOC A/CONF.151/26 (Vol. I) (Aug. 12, 1992) ("Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.").

[738] *See* Mark C. Trexler & Laura H. Kosloff, *The 1997 Kyoto Protocol: What Does it Mean For Project-Based Climate Change Mitigation?*, 3 MITIGATION ADAPTATION STRATEGIES FOR GLOBAL CLIMATE CHANGE 1, 35 (1998) ("Overly detailed reviews of environmental impacts could require the equivalent of an environmental impact statement. Such a process could prove so expansive that it would impede the ability to prepare and fund projects.").

capable of causing significant environmental degradation.[739] Resolution CONAMA 1 of 1986 list activities that are required to develop an environmental impact assessment.[740] Among them, commercial forestry activities are included. This list is illustrative and the competent environmental department if convinced by a preliminary study that a proposed activity may adversely impact the environment, may require an impact assessment. According to article 6.I(c) of the CONAMA Resolution 1/1986, the socio-economic aspects of the proposed project must be included in the impact assessment.[741]

The main problem with the current Brazilian environmental legal framework with regards to environmental impact assessments is that it does not take into consideration the peculiarities of forestry activities under carbon markets. Currently, project proponents defer to the competent environmental department the answer over whether an impact assessment is or is not required. With the increase of proposed forestry activities, such a system has the potential of producing conflicting decisions. Therefore, a clear set of domestic regulations in tune with the international carbon forest market regime of requiring a preliminary analysis to verify the potential adverse impacts of a proposed project creates a more stable and investment-friendly environment. Consequently, an increased number of high quality forestry projects are likely to take place within the Atlantic Rainforest biome.

d. Promoting Good Governance and Overcoming Legal Constraints (Education, Capacity-Building, Public Awareness, Land Tenure, Transparency and Domestic Accountability)

Article 4.1(i) of the UNFCCC called all Parties to "[p]romote and cooperate in education, training and public awareness related to climate change . . . ."[742] along with

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[739] *See* Constitution of the Federative Republic of Brazil ("Constituição da República Federativa do Brazil") [C.F.] art. 225, IV (1988). *See also* The Political Database of the Américas, Georgetown University, *available at* http://pdba.georgetown.edu/Constitutions/Brazil/brazil.html (containing an English version of the 1988 Brazilian Constitution) (last visited Jun. 2, 2008).

[740] *See* Conselho Nacional do Meio Ambiente [Environmental National Council], Resolution 1/1986 [hereinafter CONAMA Resolution], *available at* http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=23.

[741] *See* Conselho Nacional do Meio Ambiente [Environmental National Council], Resolution 1/1986, art. 6.I(c) [hereinafter CONAMA Resolution], *available at* http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=23.

[742] *See* United Nations Framework Convention on Climate Change, art. 4(1)(i), May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

the promotion of education, training and public awareness.[743] Under this section, each of the above listed socio-economic elements included in what this study refers to good governance are worthy of a thorough and complementary examination for a specific set of policies capable of addressing each one of them in the context of promoting market-based economic incentives.[744] But this would fall outside the scope set forth this thesis. Moreover, all of these elements are already analyzed in specific sections of this study as they relate to the set of policies proposed for an ampler use of forestry market-based incentives for the Atlantic Rainforest biome. For the purpose of this section, these socio-economic elements are gathered with the sole objective of reading them in light of a proposed climate change legislative bill numbered 3,535 of 2008 currently before the Brazilian Congress.[745]

Governmental policies are one major contributor to forest loss. With the Atlantic forest is no different. Public policy privileging the granting of property rights to settlers over those traditional and more sustainable forms of land ownership rights is one such example.[746] In that sense, good governance in the carbon forest market sector can be achieved by supporting domestic legislation that enhances the role of sinks in the climate change legal regime.[747] Legislation could be aimed at, *inter alia*, combating corruption, regulating ownership and management of public forested areas, reconciling the interests of private owners (land tenure), promoting education, providing training

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[743] *See* United Nations Framework Convention on Climate Change, art.6, May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[744] *See* KENNETH M. CHOMITZ ET AL., WORLD BANK, OVERVIEW: AT LOGGERHEADS? AGRICULTURAL EXPANSION, POVERTY REDUCTION, AND ENVIRONMENT IN THE TROPICAL FORESTS 22 (2007), *available at* http://siteresources.worldbank.org/INTTROPICALFOREST/Resources/2463822-1161184206155/3060670-1161608416166/PRR-AL_SAOverviewwebnonembargo.pdf ("While forests have many environmental benefits, only two command a global constituency with potentially large willingness to pay for those benefits: carbon storage and conservation of globally significant biodiversity. Mobilizing global finance for these environmental services is a crucial long-term challenge.").

[745] *See* Proposed Bill 3,535 (2008), *available at* http://www.planalto.gov.br/cccivil_03/Projetos/Quadros/quadro_PL/2008.htm

[746] *See* Carlos Galindo-Leal et al., *State of the Hotspots: The Dynamics of Biodiversity Loss*, *in* THE ATLANTIC FOREST OF SOUTH AMERICA 12, 17 (Carlos Galindo-Leal and Ibsen de Gusmão Câmara eds., 2003) ("Another indirect cause of biodiversity loss is the design of many government policies. In many countries, government policies are more likely to grant property rights to settlers who clear and settle forests and other biodiversity-rich areas than to those who operate under traditional land ownership rights or who practice more sustainable methods of resource use. Although traditional resource use patterns can be sustainable, the dynamics between poverty and inequality, higher population densities, increased reliance on the market economy, perverse subsidies, government policies, and new technologies have dramatically altered the human-nature relationship.").

[747] *See* KENNETH L. ROSENBAUN ET AL., FOOD & AGRIGULTURE ORGANIZATION OF THE U.N., CLIMATE CHANGE AND THE FOREST FACTORS: POSSIBLE NATIONAL AND SUBNATIONAL LEGISLATION 31 (2004), *available at* ftp://ftp.fao.org/docrep/fao/007/y5647e/y5647e00.pdf ("Having a legal foundationfor forest [greenhouse gas] mitigation projects will enable forests to play a positive role in UNFCCC compliance.").

and public awareness, and ensuring transparency.[748] In addition, a clear regulatory regime laying down the legal nature of carbon credits generated under project activities for the purpose of taxation is an additional element to attract investments aimed at fostering the market.[749]

In 2008, after a long process of public consultation, a bill was proposed to the Brazilian Congress aimed at creating the country's National Policy on Climate Change.[750] Although it constituted an important step towards a unified system capable of coordinating federal, state and municipal mitigation and adaptation strategies, it left unresolved the abovementioned socio-economic constraints currently facing forestry market-based incentives. Actually, in this regard, the bill innovates in its article 5 by expressly mentioning that economic policies as instruments of mitigation and adaptation policies are among the bill's directives.[751] Furthermore, in establishing the instruments of the Climate Change National Policy, the bill includes those economic incentives currently available under the Kyoto Protocol and any other that might exist of national applicability.

If not well suitable for addressing the socio-economic constraints facing project-based forestry activities in Brazil, for the first time since the 1992 UNFCCC the country takes concrete action on recognizing its role on mitigation and adaptation strategies to combat global climate change. In addition, if the bill is successful in becoming a law it can trigger related legislative action capable of resolving the above listed good governance constraints in the forestry market sector. Ultimately, along with international cooperation, stronger link with other major multilateral environmental agreements and the proper utilization of environmental and socio-economical impact analysis, assessments and standards, a well planned and comprehensive domestic legal framework specifically designed for national strategies on climate change will create a

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[748] *See* KENNETH M. CHOMITZ ET AL., WORLD BANK, OVERVIEW: AT LOGGERHEADS? AGRICULTURAL EXPANSION, POVERTY REDUCTION, AND ENVIRONMENT IN THE TROPICAL FORESTS 23 (2007), *available at* http://siteresources.worldbank.org/INTTROPICALFOREST/Resources/2463822-1161184206155/3060670-1161608416166/PRR-AL_SAOverviewwebnonembargo.pdf (providing policy recommendations for maximizing forest management and conservation while reducing poverty).

[749] *See generally* GABRIEL SISTER, MERCADO DE CARBONO E PROTOCOLO DE QUIOTO – ASPECTOS NEGOCIAIS E TRIBUTAÇÃO, ["CARBON MARKET AND THE KYOTO PROTOCOL - TAXATION AND BUSINESS ASPECTS"], 33-38 (Elsevier 2007) (laying down the importance of determining the legal status of carbon credits (i.e. whether services or goods for the purpose of taxation in Brazil aimed at creating a more investor friendly environment).

[750] *See* Proposed Bill 3,535 (2008), *available at* http://www.planalto.gov.br/cccivil_03/Projetos/Quadros/quadro_PL/2008.htm

[751] *See* Proposed Bill 3,535 (2008), art. 5, *available at* http://www.planalto.gov.br/cccivil_03/Projetos/Quadros/quadro_PL/2008.htm

stable environment capable of promoting forestry market initiatives throughout the country. By addressing the above listed good governance constraints, this legal framework will stimulate forestry restoration and preservation projects on the Atlantic Rainforest biome and thus assist with compliance and enforcement efforts currently restricted to what has proven to be an ineffective command-and-control regime.

8. Conclusion

The world's tropical forests are at great risk. Among them lies the Brazilian Atlantic Rainforest, one of the world's richest biodiverse ecosystems. After over five hundred years of intense and unsustainable exploitation, the Atlantic forest is one of the most threatened tropical forests on Earth. Only in the past two decades, legislators started to agree upon a command-and-control regime aimed at curbing deforestation rates in this important biome. The results are still incipient. Concomitantly, international action towards forest conservation and regeneration strengthened during the 90s and is reflected in different multilateral environmental agreements (i.e. forest principles of the UNCED, CBD, UNFCCC and Chapter 11 of Agenda 21).

Of importance to this study, a parallel forest market-based economic incentive inspired by philanthropic and/or corporate environmental and social responsibility reasons started to foster forest regeneration and conservation practices. Under the climate change regime set forth the UNFCCC and implemented by the 1997 Kyoto Protocol, an international regulatory market-based economic incentive was put into place also aimed at *inter alia* at fostering forestry practices. Although limited in scope to human induced-afforestation and reforestation activities, the Kyoto market served to boost different markets worldwide while also calling for the Party's attention to expand the scope of allowable forestry practices for the post-2012 commitment period. Under a new regime, avoided deforestation practices would be accountable for in what the Parties named "reduce emissions from forest deforestation and degradation". The terms of how this new agreement will operate remains open, but fact is voluntary forest market initiatives have long been accepting forest conservation and preservation practices.

In light of these available different forest market-based initiatives and historical deforestation rates and patterns of the Brazilian Atlantic Rainforest, this study proposed to address the following problems: 1) whether the current command-and-control regime

for the Brazilian Atlantic Rainforest is being successful in and sufficient to promote conservation and regeneration practices; 2) whether this legal framework is receptive of auxiliary market-based economic incentives; 3) whether existing forest market-based economic incentives can assist on maximizing the legal framework currently in place and applicable to the Atlantic Rainforest; and 4) how the Atlantic forest's legal framework should be construed differently to benefit from the rules of the available regulatory and voluntary carbon markets.

In response to the first and second queries, official dated reported by satellite imaging revealed by the INPE demonstrates that deforestation rates for the Atlantic Rainforest increased over the past two decades. As of today, only 7.26% of the entire biome remains preserved. During this same period, important protective forest laws and regulations were enacted building upon the provisions of the 1965 Forest Code. They include the 1988 Brazilian Constitution, Decrees 99,547 of 1990 and 750 of 1993, CONAMA Resolution 249 of 1999, Laws 9,985 of 2000, 11,284 and 11,428 of 2006 and the regulatory Decree 6,660 of 2008. Enforcement laws were also passed during that time and include Laws 6,938 of 1981 (the National Environmental Policy Act), 7,347 of 1985 (Civil Public Action) and law 9,605 of 1998 and its regulatory Decree 6,514 of 2008. While part of this legal framework is relatively recent, increased deforestation rates indicate that the command-and-control regime is not being effective. Moreover, the incorporation and reception of economic incentives as instruments of forest policies in some of the most recent laws (i.e. 9,985/2000, 11,284/2006 and 11,428/2006) and a proposed bill currently being debated in Congress over a national climate change strategy indicates an implicit recognition that additional enforcement and compliance efforts are necessary to curb deforestation within the Atlantic Rainforest biome.

Even though broadly incorporated and not well defined by this above stated legal framework, market-based incentives as instruments of forestry policy is permitted under the Brazilian environmental legal framework. In addition to being expressly stated by the abovementioned laws, Brazil is a signatory and ratified the UNCED embracing Principle 16, the UNFCCC and the Kyoto Protocol. In addition, no legal restriction exists to enjoin a private corporation's will to invest in forest conservation and regeneration projects as long as subject, evidently, to the procedural and instrumental environmental rules set forth the environmental legal regime. Therefore,

no prohibition whatsoever exists on the Brazilian environmental legal framework that could enjoin voluntary or regulatory carbon forest markets.

Once official deforestation data implies the failure of a regime strictly construed upon a command-and-control system and considering there is no limitation to the use of market-based incentives, this study concludes that existing carbon forest markets are viable, valuable and concrete initiatives to maximize the efficacy of the current Atlantic forest protective legal framework. For that to happen, in the regulatory market at the international level, political and legal obstacles including overcoming U.S. resistance to ratify the Kyoto Protocol, the E.U. refusal to accept carbon forest credits in its E.T.S. and the expansion of current permitted activities (afforestation/reforestation) under the CDM to accepting avoided deforestation practices must be overcome. Stronger links with other multilateral environmental agreements, such as the biodiversity convention, the convention to combat desertification and international organizations, such as the International Labor Organization and the World Bank, for instance, must be sought. Strengthening these kinds of links is crucial for the development of project standards beyond just climate change mitigation and the requirement of preliminary socio-economic analyzes.

In addition, still under the regulatory and international level, simpler technical methodological rules without undermining the problems of non-permanence/reversibility and leakage shall be designed and planned. That reflects positively at the national level. According to the current baseline and additionality rules under the CDM, the only Brazilian law capable of enjoining a project activity is the 1965 Forest Code when it establishes mandatory regeneration provision upon landowners. But if because no legally-binding regeneration action is required besides just setting a portion of the land aside (area of permanent preservation), or because the legally-binding regeneration timetable is overestimated (30 years for areas of legal reserves), or even because ecological hurdles (invasive species impeding natural regeneration) or due to a general non-compliance trend, these methodological technical challenges on a case-by-case basis can be overcome.

Considering strong and effective international regulatory set of rules for a carbon forest market initiative has the potential to foster voluntary markets and taking into account their quantitative and qualitative growth over the past decade, they constitute additional economic incentives to boost conservation and regeneration practices on the Atlantic Rainforest biome. Voluntary forest markets are still far from being able to

impact positively on the overall problem of global warming, but they have come long ways. At the local level, with the engagement of not-for-profit organizations, the development of additional ecosystem services and socio-economic standards, voluntary markets started to promote sustainable forestry practices and benefit traditional communities. Problems like the lack of transparency due to the variety of existing initiatives, flexible and not always reliable set of rules and data and the inexistence of uniform registration, certification and verification processes are among the obstacles that must be overcome to incentivize further voluntary initiatives.

Finally, for the Atlantic Rainforest to take maximum advantage of the promising benefits from market-based incentives, the legal framework currently in place must be construed differently. Economic incentives as instruments of forestry policy as stated by the above mentioned forest laws are broad in nature and therefore leave unresolved critical aspects of good governance and political constraints that constitute important elements to foster carbon forest markets. These elements include promoting environmental education and capacity-building, public awareness, a more efficient system of property rights and land-tenure, transparency and, above all, domestic accountability. Ideally, they should be addressed as part of the proposed national climate change plan of action currently being debated in Congress. But because that can take a long time to be effectively implemented, combined federal, state and municipal efforts in addressing those issues through legislation and regulation, community involvement, integrated and coordinated environmental and socio-economic enforcement and compliance actions must be developed to minimize the adverse impacts of poor governance and political constraints upon carbon forest markets within the Atlantic Rainforest biome.

The Brazilian Atlantic Rainforest is just a small part of the problem, but at the same time an extremely useful case-study. An area that was once over twice the size of France and is left to less than ten percent of its original size and still holds one of the world's highest rates of biodiversity, if can be saved by the current climate change regime, it can offer not only a remarkable sign to policy-makers around the world in charge of threatened tropical forests, but can also improve the quality of millions of Brazilian inhabitants. Additionally, if carbon forest markets are successful in promoting conservation and regeneration policies on the Atlantic Rainforest biome, along with the benefits to the global climate, many other ecosystem services will be restored, something that the Convention on Biological Diversity has long ascribed to be of

common concern of humankind. In the end, everything seems to come down to a general proverb recalled by James Gustave Speth that states: "conservation without money is conversation."[752]

[752] JAMES GUSTAVE SPETH, RED SKY AT MORNING 42 (2004).