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A Green Solution to Climate Change: The Hybrid Approach to Crediting Reductions in Tropical Deforestation

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INTRODUCTION

Global climate change is a multi-faceted international crisis that requires creative and flexible regulatory solutions. Addressing the principal anthropogenic cause of climate change—carbon dioxide emissions from the burning of fossil fuels—has been the focus of the international response to global climate change to date.[1] However, a significant and often overlooked source of global carbon dioxide emissions is deforestation, which accounts for up to eighteen percent

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1. *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change art. 3, Dec. 11, 1997, 2303 U.N.T.S. 162, 216 [hereinafter Kyoto Protocol] (establishing emissions reduction targets and timetables pursuant to which parties must reduce carbon dioxide emissions to 1990 levels by an average of 5% below their 1990 levels over a five-year commitment period from 2008–2012). For a discussion of the need to address alternatives to traditional command-and-control emissions reductions and apply more flexible regulatory approaches in the fight against climate change, see generally Jillian Button, *Carbon: Commodity or Currency? The Case for an International Carbon Market Based on the Currency Market*, 32 HARV. ENVTL. L. REV. 571 (2008); Christopher Carr & Flavia Rosembuj, *Flexible Mechanisms for Climate Change Compliance: Emission Offset Purchases Under the Clean Development Mechanism*, 16 N.Y.U. ENVTL. L.J. 44 (2008); Robert DeLay, *Our Post-Kyoto Treaty Climate Change Framework: Open Market Carbon-Ranching as Smart Development*, 17 PENN. ST. ENVTL. L. REV. 55 (2008); Albert Mumma & David Hodas, *Designing a Global Post-Kyoto Climate Change Protocol That Advances Human Development*, 20 GEO. INT'L ENVTL. L. REV. 619 (2008); Romulo Silveira da Rocha Sampaio, *Seeing the Forest for the Treaties: The Evolving Debates on Forest and Forestry Activities Under the Clean Development Mechanism Ten Years After the Kyoto Protocol*, 31 FORDHAM INT'L L.J. 634 (2008); Sophie Smyth, *Can Business Learn to Love the Environment? The Case for a U.S. Corporate Carbon Fund*, 58 RUTGERS L. REV. 451 (2006).

of global carbon dioxide emissions annually.[2] Tropical forests store 120-400 tons of carbon per square hectare of vegetation, which is released into the atmosphere when the forests are burned or harvested.[3]

The critically important role that forests play in international carbon release and storage has been a recent focus of negotiations of the Conference of the Parties (COP) to the Kyoto Protocol in Bali, Indonesia[4] and Poznan, Poland.[5] The Kyoto Protocol expires in 2012,[6] and negotiations for the terms of its successor are underway as of this writing.[7] A focus of these negotiations is that it is essential to establish regulatory mechanisms to help curb emissions from tropical deforestation in any effective post-Kyoto plan to combat global climate change.[8]

Despite increasing awareness of the link between deforestation and climate change, tropical deforestation rates are accelerating dramatically. International deforestation in the past 240 years has caused a net release of approximately 121 gigatons of carbon, sixty percent of which is attributable to tropical deforestation in the past

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2. SIR NICHOLAS STERN, THE STERN REVIEW ON THE ECONOMICS OF CLIMATE CHANGE 171 (2006), *available at* http://www.hm-treasury.gov.uk/stern_review_report.htm. Deforestation is the second largest cause of greenhouse gas emissions in the world. Daniel Howden, *Destruction of Rainforest Accelerates Despite Outcry*, INDEP., Jan. 18, 2008, *available at* http://www.independent.co.uk/environment/green-living/destruction-of-rainforest-accelerates-despite-outcry-770904.html.

3. William F. Laurence, *A New Initiative to Use Carbon Trading for Tropical Forest Conservation*, 39 BIOTROPICA 20, 21 (2007).

4. *See* Dan Shapely, *Corals and Forests: Climate Fix or Consensus Foe? Friday's Roundup of News from the U.N. Global Warming Summit in Bali,* THE DAILY GREEN, Dec. 7, 2007, http:// www.thedailygreen.com/environmental-news/latest/coral-forest-climate-47120706; Mark Kinver, *Forests 'facing a testing time', BBC NEWS*, Mar. 16, 2009, http://news.bbc.co.uk/2/hi/science/nature/7942237.stm.

5. *See* National Association of Forest Industries, Australian Forest Industries Delegation at Poznan Climate Change Negotiations, 1–12 December 2008, *available at* http://www.nafi.com.au/userfiles/briefing/Update%20on%20UNFCCC%20forest%20delegation.pdf; Anup Shah, *COP14 – Poznan Climate Conference,* GLOBAL ISSUES, Jan. 1, 2009, http://www.globalissues.org/article/771/cop14-poznan-climate-conference.

6. *See* Kyoto Protocol, *supra* note 1, art. 3.

7. The 15th COP meeting, which addressed goals and strategies for Kyoto's successor, was held in Copenhagen, Denmark on December 7–18 2009. *See generally* COP15 United Nations Climate Change Conference Copenhagen 2009, http://en.cop15.dk/ (last visited Dec. 28, 2009).

8. An incentive mechanism to reduce deforestation in developing countries also is important because it would likely goad U.S. participation in future international climate change negotiations. *See* Laurence, *supra* note 3, at 23. One of the principal concerns that kept the U.S. out of Kyoto was the Protocol's failure to address increasing carbon emissions from developing countries. *Id.*

half century.[9] During the 1980s, tropical deforestation accounted for more than ninety percent of carbon dioxide emissions from deforestation.[10] In 2007, the deforestation rate of the Amazon in Brazil nearly quadrupled for the months of August through December, with monthly numbers increasing from 234 square kilometers in August to 948 square kilometers in December.[11] In 2008, Brazil's National Institute of Space Research reported that newly deforested areas in the Amazon comprised 1124 square kilometers in April, 1096 square kilometers in May, and 870 square kilometers in June.[12] Tropical deforestation in Indonesia is even more staggering, with rates in excess of one million hectares per year as of this writing.[13]

Tropical deforestation is a multi-faceted threat to the international climate change crisis. In addition to releasing stored carbon, it reduces the remaining forests' capacity to absorb carbon from the atmosphere.[14] Furthermore, the loss of tropical forests will have significant effects on our planet's natural climate stabilizers. For example, the Amazon rainforest alone emits approximately seven trillion tons of water per year into the atmosphere, which ultimately turns into water vapor.[15] This water vapor has a significant cooling effect on global climate patterns.[16]

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9. DAVID HUNTER, ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 637 (Foundation Press 2007).

10. *Id.* at 637–38.

11. Michael Kepp, *Recent Jump in Amazon Deforestation Rates Prompts Brazil to Adopt Emergency Measures*, 31 INT'L ENV'T REP. 113, 113 (2008).

12. Port of Entry, Brazil: Deforestation in the Amazon Dropped 62.8% in July (Sept. 2, 2008), http://www.portofentry.com/site/root/resources/industry_news/6954.html. In 2007, the World Wildlife Fund published a report that predicts that the Amazon could be essentially decimated by 2030. WORLD WILDLIFE FUND, Amazon – World's Largest Tropical Rain Forest and River Basin, http://www.worldwildlife.org/what/wherewework/amazon/index.html (last visited Dec. 28, 2009).

13. FOREST INVENTORY AND MAPPING CENTRE: MINISTRY OF FORESTRY, MONITORING OF DEFORESTATION RATE IN INDONESIA: ANALYSIS AND EXPLANATION, *available at* http://www.dephut.go.id/informasi/unff/COP%2013/Model%20no%203%20utk%20email.pdf. With approximately 120 million hectares, Indonesia ranks third in the world in rainforest area after Brazil and the Congo. *Carbon Absorbing Tropical Forests a Potential Goldmine*, CARBON OFFSETS DAILY, Feb. 25, 2009, http://www.carbonoffsetsdaily.com/top-stories/carbon-absorbing-tropical-forests-a-potential-gold-mine-4797.htm.

14. *See* HUNTER, ET AL., *supra* note 9, at 631.

15. PAULO MOUTINHO ET AL., *Introduction*, *in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 7, 8–9 (Paulo Moutino & Stephen Schwartzman eds., 2005).

16. *See id.* at 9.

Under the Kyoto Protocol,[17] countries that are undergoing or are susceptible to engaging in large-scale deforestation have no incentive to curb these emissions.[18] At present, the market drivers of deforestation[19] are simply more profitable for developing nations[20] than forest conservation.[21] In the absence of a carbon crediting scheme for developing tropical nations to earn tradable carbon credits for reducing deforestation, there is little financial incentive for these nations to reduce their deforestation practices.[22] Furthermore, even if a plan is adopted offering nations financial incentive to decrease deforestation, certain nations with low deforestation rates still have little if any incentive to decrease deforestation due to the methodology used for crediting tradable carbon credits.[23]

The Kyoto Protocol's Clean Development Mechanism (CDM),[24] which allows Annex I nations[25] to meet their Kyoto emissions limits by investing in emissions reductions projects in developing countries, currently offers no tradable credits to Annex I countries' projects that credit tropical nations for reducing deforestation.[26] Consequently, the

17. Kyoto Protocol, *supra* note 1.

18. MOUTINHO, ET AL., *supra* note 15, at 47–48.

19. The market drivers of deforestation in developing nations include forces more subtle than logging and "slash and burn" activities. According to a 2007 report from the Center for International Forestry Research, "[f]orces such as fluctuations in internal commodity process; agricultural and., more recently, biofuel subsidies; and roads and other infrastructure projects can encourage forest clearing." *New Report on Deforestation Reveals Problems of Forest Carbon Payment Systems*, ENVTL NEWS NETWORK, Dec. 7, 2007, http://www.enn.com/wildlife/article/26764. *See also* Lesley K. McAllister, *Sustainable Consumption Governance in the Amazon*, 38 ENVTL. L. REP. 10873, 10873–76 (2008) (discussing cattle, soybeans, and biofuels as the commodity drivers of deforestation in the Amazon).

20. This article focuses on tropical developing nations and, therefore, all references to "developing nations" refer to tropical developing nations.

21. *See* Gustavo A. B. da Fonseca et al., *No Forest Left Behind*, 5 PUB. LIBR. OF SCI. BIOLOGY 1645, 1645 (2007), *available at* http://biology.plosjournals.org/archive/1545-7885/5/8/pdf/10.1371_journal.pbio.0050216-L.pdf.

22. *Id.*

23. *See id.*

24. *See* Kyoto Protocol, *supra* note 1, art. 12.

25. An Annex 1 nation is an "industrialized" country that has agreed to reduce its emissions below its 1990 levels as a party of the Kyoto Protocol., whereas Annex 2 nations were considered developing countries at the time of the agreement in 1992. The following are classified as Annex 1 countries: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, and the United States. Mumma & Hodas, *supra* note 1, at 650.

26. *See* MOUTINHO, ET AL., *supra* note 15, at 49.

international community is failing to capitalize on the international carbon market, which is a potentially valuable weapon for developing and developed nations seeking to reduce carbon emissions in the fight against climate change.

The prevailing scientific consensus today is that to avoid "dangerous" impacts from climate change, the Earth's average temperature should not rise more than two degrees Centigrade.[27] To achieve this goal, Annex I nations must significantly curb their greenhouse gas (GHG) emissions.[28] However, emissions reductions from Annex I nations alone will not be sufficient to prevent a greater than two degree Centigrade increase in temperature. The Stern Review determined that even if emissions from developed nations are reduced to zero by 2050, the developing world would still have to reduce emissions by at least forty percent from baseline rates to stabilize global atmospheric carbon enough to prevent a greater than two degree Centigrade increase in the Earth's average temperature.[29] Even though offering developing nations an incentive to curb deforestation rates is not a panacea to the global climate change problem, it is a significant step toward achieving net emissions reductions in the developing world.

Part I of this article examines how the Kyoto Protocol currently incorporates forestry projects as a tool to combat climate change and how those efforts can be improved to more fully embrace carbon markets as a mechanism to credit efforts to curb tropical deforestation. Part II evaluates four potential impediments to crediting efforts to curb deforestation: additionality, leakage, permanence, and monitoring. Part III discusses the compensated reductions plan and the European Commission Joint Research Centre proposal, two existing proposals to credit developing nations for reducing emissions from tropical deforestation. Part IV proposes the Hybrid Compensated Reductions and Preventive Credits plan to credit developing nations for reducing emissions from tropical

27. A 2° Centigrade increase in global average temperature would still result in significant adverse impact to climates in certain areas of the world. So, while a 2° Centigrade increase would not be a "safe" increase in global average temperature, it is a good baseline goal from which a mitigation policy to combat climate change can be developed. *See generally* Malte Meinshausen, *What Does a 2°C Target Mean for Greenhouse Gas Concentrations? A Brief Analysis Based on Multi-Gas Emission Pathways and Several Climate Sensitivity Uncertainty Estimates*, *in* AVOIDING DANGEROUS CLIMATE CHANGE 265 (Hans Joachim Schellnhuber et al. eds., 2006).

28. *See* STERN, *supra* note 2, at 206.

29. *Id.*

deforestation. This proposal combines concepts from the compensated reductions plan and the European Commission Joint Research Centre proposals. The hybrid plan offers developing nations an incentive to curb tropical deforestation rates by providing the necessary financial support, through enabling carbon credit trading, to execute and maintain these reductions. The hybrid plan would also require nations to account for forests at the national level rather than the project level, and would provide an incentive for nations with high proportions of remaining forest cover and low deforestation rates to prevent increases in their domestic deforestation rate.

I. CARBON TRADING AND DEFORESTATION

The international carbon market is quickly emerging as a major force in emissions reduction compliance.[30] The carbon trading market enables entities that wish to exceed their predetermined allotment of carbon dioxide emissions to purchase credits from another entity that has not exhausted its predetermined quota.[31] This administrative mechanism ensures that only a certain amount of carbon dioxide will be released into the atmosphere and allows the entities to trade and negotiate to remain in compliance.[32] This practice promotes flexibility and is a cheap and relatively easy method to ensure regulatory compliance.[33] It also provides economic benefits to those entities that are able to remain within their allotment. This process of buying and selling is known as carbon trading.

The current carbon market has two principal methods for reducing greenhouse gas (GHG) emissions.[34] The first is a cap and trade system. Under this system, a regulated source's GHG emissions are capped by a regulatory body.[35] Sources whose emissions are below permitted levels can sell the unused emissions on the carbon

30. Trade in carbon credits increased approximately eighty percent from 2006 to 2007. Timothy Gardner, *Global Carbon Trade Rose 80 Percent Last Year*, REUTERS, Jan. 18, 2008, http://uk.reuters.com/article/environmentNews/idUKN1832831820080118. The total value of the carbon market more than doubled its worth in 2008, to approximately $125 billion dollars. Press Release, Point Carbon, 4.9Gt CO2e Traded in 2008 - Up Massive 83% on Previous Year (Jan. 14, 2009), http://www.pointcarbon.com/aboutus/pressroom/pressreleases/1.1036167.

31. Jessica Daly, *Trading the Carbon Market*, CNN, Sept. 1, 2008, http://www.cnn.com/2008/TECH/science/09/01/carbon.trading.pv/index.html.

32. *See id.*

33. *See id.*

34. *See* Carr & Rosembuj, *supra* note 1, at 44.

35. *Id.*

market.[36] Likewise, a source whose emissions exceed its allowance can purchase carbon credits on the carbon market to comply with the regulatory cap.[37]

The other method is an emissions offset program, where emissions offsets are generated from projects that take place outside of the regulated community.[38] The emissions offsets created by such projects can be sold to entities seeking to comply with their commitments within the regulated community.[39] This model is available under the CDM in the Kyoto Protocol, whereby Annex I nations can use this "flexibility mechanism" to comply with their capped emissions limits set by the treaty.[40] The CDM has been implemented in a wide variety of projects throughout the developing world.[41]

This section first considers the CDM's objectives and procedures and examines how this flexible compliance mechanism in the Kyoto Protocol fails to provide an adequate incentive to curb deforestation in developing countries. It then considers how crediting reduced emissions from degradation and deforestation (REDD) in developing countries can help advance the international effort to combat climate change.

A. The Clean Development Mechanism

The Kyoto Protocol sets mandatory emissions reductions targets for Annex I countries that must be met by the end of the first commitment period of 2008-2012.[42] To achieve this goal in a cost-effective manner, Annex I nations are able to supplement a portion of their emission reduction requirements through three flexibility mechanisms: joint implementation (JI),[43] the CDM, and international

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36. *Id.*

37. *Id.*

38. *Id.*

39. *Id.* at 44–45.

40. Carr & Rosembuj, *supra* note 1, at 46.

41. *See id.* at 52–53 (explaining that a variety of projects have been launched under the CDM including renewable energy projects, energy efficiency projects, fuel switching, capping landfill gases, and controlling emissions of certain industrial gases).

42. *Id.* at 46.

43. Joint implementation ("JI"), defined in Article 6 of the Kyoto Protocol, offers parties a cost effective way to comply with the Kyoto Protocol by allowing Annex I countries to earn emission reduction units (ERUs) from participation in an emission reduction project of another Annex 1 country. *See* Kyoto Protocol, *supra* note 1, art. 6. For a JI project to proceed, the

emissions trading.[44] Under the CDM, Annex I countries can earn certified emission reductions (CERs) for financing projects that reduce emissions in developing countries that have no commitments under Kyoto.[45] Annex I countries can use these CERs for compliance with their emissions targets.[46]

Forestry projects now can earn tradable credits through the CDM and joint implementation, but such projects are limited to afforestation and reforestation.[47] Afforestation and reforestation both refer to anthropogenic conversion of non-forested areas into forested land.[48] The difference is that afforestation refers to projects on land that has not been forested for at least fifty years, while reforestation refers to the conversion of non-forested areas that have not been forested since December 31, 1989.[49] These afforestation and reforestation credits are capped for use by Annex I parties at one percent of their base-year emissions or five percent of emissions during the entire five-year commitment period from 2008 to 2012.[50]

The CDM is governed by the United Nations Framework Convention on Climate Change (UNFCCC) and is supervised by the CDM Executive Board.[51] The Conference of the Parties has declared that the triad of mechanisms (JI, CDM, and emissions trading) were intended to enable flexibility in compliance efforts but also were

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reduced emissions must exceed those that would have occurred without the project. *Id.* Annex I parties may not exclusively rely on JI credits to meet their targets. *Id.*

44. Carr & Rosembuj, *supra* note 1, at 46.

45. *Id.* at 47.

46. *Id.* As of this writing, there are more than 4200 projects in progress under the CDM, including 1873 registered projects and an additional 109 projects requesting registration. *See* CDM Statistics, http://cdm.unfccc.int/Statistics/index.html (last visited Dec. 28, 2009).

47. *See* Bernhard Schlamadinger et al., *Should We Include Avoidance of Deforestation in the International Response to Climate Change?*, *in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 53, 53 (Paulo Moutinho & Stephan Schwartzman eds., 2005).

48. Silveira da Rocha Sampaio, *supra* note 1, at 643.

49. *Id.* Some commentators have argued that many tropical forest species can survive in the "new growth" or "secondary forest" after the old forest areas have been cut. Erik Stokstad, *A Second Chance for Biodiversity*, SCIENCE, June 13, 2008, at 1436. However, regardless of re-growth, there is a vital need to conserve the remaining old-growth tropical forests. "Primary forest is even harder to replace than many researchers expect," says Toby Gardner of the Federal University of Lavras in Brazil. *Id.* "For many species, once these virgin forests have gone there is nowhere else to go." *Id.* Many species, such as the harlequin toad, require old-growth forest habitat to survive. *Id.*

50. Silveira da Rocha Sampaio, *supra* note 1, at 658.

51. MEINHARD DOELLE, FROM HOT AIR TO ACTION? CLIMATE CHANGE, COMPLIANCE AND THE FUTURE OF INTERNATIONAL ENVIRONMENTAL LAW, 29–34 (2005).

meant to supplement domestic actions.[52] The CDM allows industrialized countries that are parties to Kyoto to invest in emission-reducing products of non-party developing countries.[53] The purpose of this mechanism is to build relations between industrial and developing countries and encourage a sustainable environment by allowing industrialized countries to reduce carbon emissions at a lower cost.[54] This mechanism also is beneficial in that it allows non-party countries to become involved in the overall goal of reducing carbon emissions while enabling exposure to resources and technology that will encourage development of their own countries. Therefore, the CDM ultimately seeks to "bridge the political divide between developed and developing countries as their industries take action together."[55]

Nevertheless, the requirements of a CDM project are so stringent that the benefits are impossible for some applicants to obtain.[56] The following issues must be considered for a CDM project: (1) project participants and other parties involved; (2) technologies used in the project; (3) baseline, validation, and verification methodologies; (4) location of the project and status of the host country authorization letter; (5) ownership of CER's; (6) additionality; (7) environmental and/or community development benefits resulting from the project; (8) monitoring; and (9) a verification plan.[57]

The strict requirements of the CDM process begin with a project design document submission to the Executive Board, a ten member panel which is part of the UNFCCC.[58] This project design document contains a detailed description of the proposed project and how it will reduce GHG emissions.[59] To gain approval, the project design

52. David Takacs, *Carbon Into Gold: Forest Carbon Offsets, Climate Change Adaptation, and International Law*, 15 HASTINGS W. N.W. J. ENVTL. L. & POL'Y 39, 53 (2009).

53. *Id.* at 40.

54. *See id.* at 81.

55. Jack Cogen, Chief Exec. Officer, Natsource L.L.C., Why the US Needs Access to International & Domestic Carbon Markets, remarks at Carbon Markets Insights Americas Conference (Oct. 30, 2007), *available at* http://www.natsource.com/uploads/news/Jack%20Cogen%20-%20CarbonForum%20LONG%20Remarks.doc.

56. U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, CLEAN DEVELOPMENT MECHANISM: 2008 IN BRIEF 5–6 (2008), *available at* http://unfccc.int/resource/docs/publications/08_cdm_in_brief.pdf.

57. *Id.* at 4–5.

58. Carr & Rosembuj, *supra* note 1, at 49.

59. *Id.*

document must demonstrate that the proposed project actually creates emissions reductions that are "additional" to any reductions that would have occurred in a "business as usual" setting.[60] The developing country that hosts this project must also write a letter of approval acknowledging the project.[61] If the project is approved, or "registered," the project is then implemented and monitored to ensure that there have been real emissions reductions.[62] The GHG emissions reductions are analyzed and submitted for approval as CERs, which are issued for each ton of carbon dioxide reduced.[63]

Despite its laudable intentions, the CDM is an ineffective tool for fighting tropical deforestation. The World Wildlife Fund (WWF) has recently criticized the CDM, arguing that one in five carbon credits issued by the UNFCCC are going to projects that may have actually increased carbon emissions.[64] WWF contends that the CDM is essentially funding projects that would have proceeded regardless of the CDM project, and, consequently, most CDM projects lack "additionality."[65] For example, the World Bank recently approved funding for a 4,000-megawatt coal plant in India that will emit 25.7 million tons of carbon dioxide per year.[66] Shockingly, Annex I nations will be able to invest in this proposed coal plant to earn tradable credits via the CDM, which will allow these nations to increase their carbon emissions domestically.[67] The justification for this project is that it is deemed to be a "super-critical" coal-generating technology that will make this plant more efficient than others in

60. *Id.* at 49–50.

61. *Id.* at 50.

62. *Id.*

63. *Id.* For a discussion of the CDM process and recommendations to improve its efficiency, see generally Mindy Nigoff, *The Clean Development Mechanism: Does the Current Structure Facilitate Kyoto Protocol Compliance?*, 18 GEO. INT'L ENVTL. L. REV. 249 (2006); Michael Wara, *Measuring the Clean Development Mechanism's Performance and Potential,* 55 UCLA L. REV. 1759 (2008).

64. Michael Szabo, *A Fifth of U.N. Carbon Credits May Be Bogus*, REUTERS, Nov. 29, 2007, http://www.reuters.com/article/environmentNews/idUSL29265190200711 29?pageNumber=2&virtualBrandChannel=0&sp=true.

65. *Id.*

66. David Wheeler, *Tata Ultra Mega Mistake: The IFC Should Not Get Burned by Coal*, CARMA BLOG (Mar. 13, 2008), http://carma.org/blog/tata-ultra-mega-mistake-the-ifc-should-not-get-burned-by-coal/.

67. *See* JUDSON JAFFE & ROBERT N. STAVINS, THE HARVARD PROJECT ON INT'L CLIMATE AGREEMENTS, LINKAGE OF TRADABLE PERMIT SYSTEMS IN INTERNATIONAL CLIMATE POLICY ARCHITECTURE 12–19 (2008), http://belfercenter.ksg.harvard.edu/files/StavinsWeb6.pdf.

India.[68] However, many argue the end result of this project will result in no net reductions in carbon dioxide emissions, and will ultimately result in a net increase in carbon emissions, especially since the region of India that the plant will serve has a very outdated power grid to transport the electricity.[69]

Another criticism of the CDM is that it is only available on the project level.[70] Given the stringent requirements any CDM project faces in demonstrating that it will result in net emissions reductions, this project-level focus significantly limits the CDM's scope of potential projects.[71] One of the CDM's most glaring weaknesses, however, is its failure to acknowledge projects in developing countries that reduce deforestation. The Environmental Defense Fund argues that giving developing tropical nations market-based incentives for reducing national emissions from deforestation is one of the five necessary adjustments to make the CDM a practical tool in the fight against climate change.[72] However, due to the criticisms noted above, the CDM's overall structure, and its controversial negotiations in the Marrakesh Accords,[73] the CDM is not an effective mechanism for reducing emissions from degradation and deforestation (REDD).[74] Thus, an alternative approach must be developed to address this growing international crisis.

B. Reduced Emissions from Degradation and Deforestation

In 1997, the Kyoto Protocol established targets and timetables for emissions reductions and flexibility mechanisms to help nations meet their prescribed targets.[75] Along with the CDM, JI, and

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68. *Id.*

69. *Id.*

70. *See* JOS COZIJNSEN ET AL., *CDM AND THE POST-2012 FRAMEWORK* 6 (Envtl Defense Fund, 2007), *available at* http://www.edf.org/documents/6838_ED_Vienna_CDM%20Paper_8_22_07.pdf.

71. *See id.*

72. *See id.* at 7.

73. THE MARRAKESH ACCORDS AND THE MARRAKESH DECLARATION, *available at* http://unfccc.int/cop7/documents/accords_draft.pdf (2001). For additional discussion of these controversial negotiations, see *infra* Part IV.C.

74. *See* Rogerio F. Pinto & Jose Antonio Puppim de Oliveira, *Implementation Challenges in Protecting the Global Environmental Commons: The Case of Climate Change Policies in Brazil,* 28 PUBLIC ADMIN. DEV. 340, 346–47 (discussing how CDM projects in Brazil have clashed with local interests and values).

75. *See* ERIN C. MYERS MADEIRA, REDUCED EMISSIONS FROM DEFORESTATION AND DEGRADATION (REDD) IN DEVELOPING COUNTRIES: AN EXAMINATION OF THE ISSUES

emissions trading, a fourth mechanism—REDD—was proposed.[76] This option was deemed to have the potential to contribute the greatest and most immediate carbon stock impact.[77] Furthermore, since REDD encourages the abatement of deforestation, it would not only reduce carbon emissions but also would assist in sustainable development benefits such as biodiversity conservation;[78] watershed protection; reduction of runoff, siltation, and flooding; protection of fisheries; and sustained incomes for local communities.[79]

After this mechanism was established, research concluded that REDD activities could not be isolated and, thus, that the mechanism's specific effects could not be determined.[80] Moreover, there was significant disagreement regarding how REDD could meet these target emission rates. The Seventh Conference of the Parties (COP 7)[81] determined there were various uncertainties about the actual rate of deforestation emissions and the ability to monitor such rates.[82] Consequently, REDD projects have been excluded from

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FACING THE INCORPORATION OF REDD INTO MARKET-BASED CLIMATE POLICIES 8 (2008), *available at* http://www.rff.org/RFF/Documents/RFF-Rpt-REDD_final.2.20.09.pdf.

76. *Id.* at 1.

77. *Id.* at 14.

78. Due to the thousands of acres of rainforest destroyed or severely degraded each year, several hundred species are driven to extinction, the majority of which are never documented by science. Sustainable Amazon, BRAZILIAN EMBASSY – WASHINGTON D.C., June 17, 2007, http://www.brasilemb.org/index.php?option=com_content&task=view&id=65&Itemid=111. Moreover, there are more than one million species of animals in the Amazon. Into the Depths of the Amazon–Fauna, http://library.thinkquest.org/21395/textonly/fauna/ (last visited Dec. 28, 2009). Scientists have documented that the Amazon is the home to jaguars, harpy eagles, dolphins, manatees, sloths, and monkeys. It also hosts 950 bird species, 3000 freshwater fish species, 5000 species of trees, and the largest diversity of butterflies. Sustainable Amazon, BRAZILIAN EMBASSY – WASHINGTON D.C., June 17, 2007, http://www.brasilemb.org/index.php?option=com_content&task=view&id=65&Itemid=111. In addition to the impressive array of animal life in the Amazon, a reported 1300 medicinal species can be found in this great forest, creating a "natural medicine chest." Antibiotics, narcotics, abortive drugs, contraceptives, anticoagulants, fungicides, anesthetics, muscular relaxants, and anti-diarrheal and anti-viral medications are developed from these species. *Id.* Moreover, only 90 of the 1,300 medicinal species are commercially exploited by the pharmaceutical industry, again illustrating how invaluable these rainforests are, and how much we have to learn about them. *Id.*

79. MADEIRA, *supra* note 75, at 26.

80. *Id.* at 22.

81. U.N Framework Convention on Climate Change, Kyoto Protocol, http://unfccc.int/kyoto_protocol/items/2830.php (last visited Dec. 28, 2009) ("The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the 'Marrakesh Accords.'").

82. Annie Petsonk, *Rewarding Reductions, Realizing Results: Legal Options for Making Compensated Reductions a Reality*, *in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 119,

regulatory markets and are limited to the voluntary carbon market.[83] Voluntary carbon markets are utilized by buyers who are more interested in reducing their environmental impact or improving their environmental image, as opposed to remaining in compliance with a law or regulation.[84] In a voluntary market, credits are sold at a fraction of the price of credits sold in regulatory markets.[85]

Spurred by efforts of the Coalition for Rainforest Nations,[86] the 2005 COP 11 proposed to offer developing countries access to the carbon market through credits generated from REDD activities.[87] The UNFCC later instituted a two-year experimental period to examine the possible benefits of REDD.[88] In 2008, the World Bank announced the countries that will participate in this preliminary exhibition of REDD.[89]

In 2007, at COP 13 in Bali, REDD was again listed among the possible mitigation methods to achieve emissions targets.[90] The Forest Carbon Partnership Facility (FCPF) is researching the building capacity for REDD in developing countries as well as testing a performance-based payment program to lay a foundation of positive incentives and financing in the future.[91] The negotiations at COP 14 in Pozna in 2008 also included a thorough consideration and endorsement of REDD.[92] In December 2009, REDD was revisited at

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121 (Paulo Moutinho & Stephan Schwartzman eds., 2005), *available at* http://www.edf.org/documents/4930_TropicalDeforestation_and_ClimateChange.pdf.

83. *See id.* at 28.

84. *See generally id.*19–20 (discussing application of voluntary carbon markets to countries not parties to Kyoto treaty).

85. *See id.* at 27.

86. The Coalition for Rainforest Nations consists of more than forty developing nations that support the use of carbon credits to curb tropical deforestation. *See generally* Coalition for Rainforest Nations, http://www.rainforestcoalition.org (last visited Dec. 28, 2009).

87. Tropical Forest Group, A History of Climate Change and Tropical Forest Negotiations (Aug. 2007), http://www.tropicalforestgroup.org/articles/history.html ("At COP 11 in 2005, the idea of saving forests to prevent GHG emissions got a new title- REDD.").

88. *See* MADEIRA, *supra* note *75*, at 27.

89. *Id.* at 28. These countries include nations in Africa (Democratic Republic of Congo, Gabon, Ghana, Kenya, Liberia, and Madagascar), Latin America (Bolivia, Costa Rica, Guyana, Mexico, and Panama), and Asia (Nepal, Lao PDR, and Vietnam). These pilot countries will establish baseline emissions, exemplify monitoring strategies, and provide a glimpse of REDD in action overall to be used as a foundation for future implementation. *Id.*

90. *Id.* at 27.

91. *Id.* at 28.

92. *See* Richard Horsch, *Poznan: Progress or Procrastination?*, 11 INT'L ENVTL. L. NEWS 1, 3–5 (2009) (noting that there was consensus at Pozna that REDD should be an important component of the post-Kyoto framework).

COP 15 in Copenhagen, Denmark.[93] REDD proposals were discussed extensively at COP 15 and language was incorporated into the Copenhagen Accord recognizing the importance of REDD and the need to establish a financing mechanism for it.[94] As of this writing, however, developing countries remain ineligible to earn tradable carbon credits under the Kyoto Protocol for curbing deforestation.

The many proposed benefits of REDD projects have been diluted by an array of criticisms including methodological concerns, indigenous peoples' concerns,[95] and environmental groups' concerns. Some of the leading methodological concerns were (1) leakage,[96] (2) enforceability,[97] (3) feasibility and accuracy of monitoring and control,

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93. *See* Norton Rose, *United Nations Climate Change Conference*, http://www.nortonrose.com/knowledge/publications/2009/pub19337.aspx?page=all&lang=en-gb (last visited Dec. 28, 2009).

94 *See* Copenhagen Accord, Dec. 18, 2009, arts. 6, 8 *available at* http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf.

95. While beyond the scope of this Article, a thorough evaluation of potential impacts to indigenous peoples is indispensable for REDD to be successfully implemented into a post-Kyoto regime. Tropical rainforests are not only a home to these peoples, but also offer a way of life. They serve a cultural and spiritual purpose, in addition to providing food, medicines, and shelter. However, as logging and predation continue, the land they call home is being threatened. Indigenous peoples have relied on and co-existed with the resources of the rainforest for decades. International Expert Group Meeting on Indigenous Peoples and Climate Change (April 3, 2008) (conference paper available at United Nations Permanent Forum on Indigenous Peoples Document Library), *available at* http://www.un.org/esa/socdev/unpfii/en/EGM_A42.html. While they have learned to use rainforest resources in an efficient and sustainable way, contributing very little to mankind's ecological footprints on Earth, indigenous peoples nonetheless are positioned on the front lines to endure the greatest impacts from climate change and deforestation. *Id.* According to the anthropologist Darcy Riberio, "55 indigenous populations vanished in the first half of the 20th century." GREENPEACE, BRIEFING: DENI DEMARCATION 1 (2003), *available at* http://www.greenpeace.org/raw/content/international/press/reports/deni-demarcation-the-demarcat.pdf. Since there is such a delicate relationship of reliance and coexistence, drastic changes in these pristine forests severely affect all aspects of life for the indigenous peoples who live there. Deforestation is also forcing indigenous people to migrate to cities, which leaves these individuals in urban slums with limited opportunities for adaptation to an entirely foreign way of life. Press Release, United Nations University, Indigenous People Hardest Hit by Climate Change Describe Impacts (Apr. 2, 2008) (on file with United Nations University). Indigenous people are often the victims of human right violations, displacements, and conflicts due to "expropriation of ancestral lands and forests for biofuel plantations (soya, sugar-cane, jatropha, oil-palm, corn, etc.), as well as for carbon sink and renewable energy projects (hydropower dams, geothermal plants)." *Id.* These actions occur "without the free, prior and informed consent of [these] people." *Id.*

96. *See infra* Part II.B.

97. *See* Roger Harrabin, *Forest Plan may "Fuel Corruption,"* BBC NEWS, Oct. 14, 2008, http://news.bbc.co.uk/2/hi/sci/tech/7669215.stm ("We should not underestimate the scale of challenge faced in some forest nations where governance is virtually non-existent."); *New Report on Deforestation, supra* note 19 ("[R]educing carbon emissions from forests will require

(4) natural and anthropogenic disturbances, (5) baseline setting, and (6) additionality.[98] A major concern of indigenous peoples regarding REDD projects was forest property rights. This concern was borne from experiences in which payment for carbon services benefit corrupt officials or local elites, which ultimately harms the individual communities that make their homes in these forests.[99] Finally, environmental groups opposed the notion that wealthy nations could try to circumvent their obligations to reduce emissions under Kyoto by simply investing in REDD projects.[100] They feared that these wealthy nations would use REDD projects as a loophole to "buy their way out" of making permanent emissions reductions at home.[101] There also was a concern that investing in REDD projects could decrease investment in energy abatement technology, which prompted environmental groups, and consequently many governments, to disfavor avoided deforestation crediting.[102]

Despite these concerns, REDD continues to be accepted in principle and implemented outside the Kyoto compliance regime. In September 2008, the UN-REDD Programme was launched, which is a collaboration between the UN Environment Programme, the UN Food and Agricultural Organization, and the UN Development Programme.[103] A pilot project under the UN-REDD Programme was announced in March 2009 in which the Democratic Republic of Congo, Indonesia, Papua New Guinea, Tanzania, and Vietnam will receive $18 million to reduce GHG emissions from deforestation and support indigenous peoples' interests in the forests.[104] Bolivia, Panama, Paraguay, and Zambia also have sought funding from the UN-REDD Programme.[105]

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strengthening the weak governance mechanisms that have long proven unable to enforce many existing prohibitions on forest clearing.").

98. *See* MADEIRA, *supra* note 75, at 29.

99. *See id*; *New Report on Deforestation, supra* note 19 ("Deeply ingrained and routinely corrupt government practices often favor large corporate interests over community rights to forest resources.").

100. *See* MADEIRA, *supra* note 75, at 29.

101. *See* Laurence, *supra* note 3, at 20, 23.

102. Roger A. Sedjo & Brent Sohngen, *Carbon Credits for Avoided Deforestation* 1 (Resources for the Future Discussion Paper 2007), *available at* http://www.rff.org/rff/Documents/RFF-DP-07-47.pdf.

103. *UN scheme provides $18 million to five countries to slash emissions, create jobs,* UN NEWS CENTRE, Mar. 18, 2009, http://www.un.org/apps/news/story.asp?NewsID=30221&Cr=deforestation&Cr1.

104. *Id.*

105. *Id.*

II. CHALLENGES IN CREDITING REDD PROJECTS

Whenever a plan to award tradable carbon credits to a developing country for REDD activities is considered, four issues are typically raised: monitoring, leakage, additionality, and permanence.[106] Any effective plan to credit REDD activities must address these four issues. While monitoring can be addressed independently, leakage, additionality, and permanence are often interdependent, and any effective REDD crediting scheme must effectively balance these three issues.[107]

A. Monitoring

The ability to quantify and verify tropical deforestation is essential to any REDD crediting scheme.[108] Satellite data is the best available option to measure deforestation rates to set baselines and track deforestation after baselines have been set.[109] The problem with satellite monitoring is not a lack of scientific accuracy; rather, it stems from developing countries lacking the financial and technological resources necessary to conduct this type of monitoring.[110] As of 2006, Brazil and India were the only developing nations with the necessary infrastructure to monitor their forests via satellite.[111]

An effective forest monitoring system must cover a vast expanse of forest area repeatedly to effectively track deforestation rates.[112] Along with satellite imagery, actual field verification is necessary to validate the accuracy of satellite imagery.[113] However, field verification is only feasible in a limited number of areas. For larger

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106. *See* Marcio Santilli et al., *Tropical Deforestation and the Kyoto Protocol: An Editorial Essay, in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 47, 49–50 (Paulo Moutinho & Stephan Schwartzman eds., 2005) (explaining the nature of these four issues and how they relate to crediting reductions in tropical deforestation).

107. *See id.*

108. R. DeFries et al., *Monitoring Tropical Deforestation for Emerging Carbon Markets, in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 35, 35 (Paulo Moutinho & Stephan Schwartzman eds., 2005), *available at* http://www.edf.org/documents/4930_TropicalDeforestation_and_ClimateChange.pdf.

109. *Id.*

110. *Id.*

111. *Id.* (explaining that most tropical nations do not currently have the capabilities to effectively monitor their rainforests in order to carry out a compensated reduction scheme that shares the same monitoring methods as the hybrid plan).

112. *Id.* The hybrid plan operates on the national level; therefore, it is necessary for a monitoring system to be capable of overseeing an entire nation's tropical forests.

113. *Id.* (explaining that this is essential to verify that there is no discrepancy between the satellite imagery and the actual forest degradation on the ground).

expanses of forest, overflights and extremely high resolution imagery is necessary due to lack of access by land.[114] In reality, no one method of monitoring can be effective for monitoring all tropical forests; therefore, different methods must be adopted to effectively monitor different forests.[115]

Another issue in monitoring is determining what constitutes "deforestation."[116] Experts suggest that two factors must be established when analyzing deforestation. First, a monitoring system must identify what forest degradation is to be monitored (e.g., selective logging, clear-cut logging, slash and burn tactics, land conversion, etc.).[117] Second, a monitoring system must set forth the minimum disturbance size that will register on the monitoring scale.[118]

B. Leakage

Leakage is the concept that if deforestation is halted in one project area, the market demands will simply shift deforestation to another unregulated area, thus nullifying the benefit of emissions reductions in the project area.[119] Leakage has been a vexing problem for the CDM.[120] Because the CDM operates at the project level instead of the national level, the concern is that deforestation will simply move to another area outside of the project area within the host country.[121]

Leakage also presents a problem for forestry projects that operate on the national level. Even if a REDD scheme is implemented at the national level, there is still potential for international leakage, as the market drivers of deforestation may simply shift borders to a neighboring nation that does not participate in a REDD crediting scheme.[122] For example, one commentator has

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114. R. DeFries et al., *supra* note 108, at 40.

115. *Id.*

116. *Id.* The IPCC report on Land Use, Land Use Change, and Forestry includes multiple definitions of what constitutes "deforestation." The clearest definition is "permanent removal of forest cover," and "forest" is considered to be land covered by more than ten percent tree cover. *Id.*

117. *Id.*

118. *Id.* ("[T]he minimum size would depend on the types of forest disturbances included and the feasibility of accurate detection by available satellite sensors.").

119. Sedjo & Sohngen, *supra* note 102, at 6.

120. *See* Santilli et al., *supra* note 106, at 49.

121. *See id.*

122. *See* G.A. Silvia-Chavez, *Reducing Greenhouse Gas Emissions from Tropical Deforestation by Applying Compensated Reduction to Bolivia*, *in* TROPICAL DEFORESTATION

posed a hypothetical scenario in which Brazil adopts a REDD crediting scheme and neighboring Bolivia does not.[123] Under these circumstances, the market drivers of deforestation would simply jump the border to Bolivia to bypass Brazilian conservation laws.[124] Because any REDD scheme is likely to be voluntary for developing tropical nations, there may be many opportunities for cross-boundary international leakage.[125]

C. Additionality

Additionality is the principle that if a project seeks to earn credits in a carbon market, it should create carbon reductions that would not have occurred in the absence of the financed project.[126] The CDM has very strict additionality requirements[127] that have rendered the CDM ineffective.[128] Under the CDM, additionality often presents a technical challenge for forestry projects because the strict criteria make it difficult to identify whether a forestry project's emissions reductions would have occurred in the absence of the proposed project.[129]

Although the CDM currently involves only afforestation and reforestation projects, the same problem occurs when crediting reductions in deforestation. Because any REDD crediting scheme requires the credit accounting baselines to be set according to historic deforestation rates,[130] it is impossible to predict with complete accuracy whether deforestation will occur in a particular nation at the same or higher rate in the future. Thus, it is impossible to state that a nation's decreased deforestation over a commitment period was solely attributable to its participation in the REDD crediting scheme.

AND CLIMATE CHANGE 73, 84 (Paulo Moutinho & Stephan Schwartzman eds., 2005), *available at* http://www.edf.org/documents/4930_TropicalDeforestation_and_ ClimateChange.pdf.

123. *Id.*

124. *Id.*

125. Sedjo & Sohngen, *supra* note 102, at 7.

126. *See* T.C. Heller, *Additionality, Transactional Barriers and the Political Economy of Climate Change*, *in* INTERNATIONAL ENVIRONMENTAL AGREEMENTS ON CLIMATE CHANGE 203, 211 (Carlo Carraro ed., 1999).

127. *See generally* Carr & Rosembuj, *supra* note 1, at 46–51 (describing the CDM and its current function within the Kyoto Protocol).

128. Andrew W. Mitchell et al., *Forests NOW in the Fight Against Climate Change* 13 (Forest Foresight Report 1.v3 2008) (arguing the CDM's burdensome certification requirements and high transaction costs have resulted in less than one percent of carbon market investments in reforestation projects, and not one fully commercial project has been approved to date).

129. Silveira da Rocha Sampaio, *supra* note 1, at 670.

130. Santilli et al., *supra* note 106, at 49.

There is always the possibility that the decreases in tropical deforestation were attributable to some other source. As discussed in Part IV of this Article, addressing both additionally and leakage on the international level can be problematic.

D. Permanence

The issue of permanence speaks to the security of emissions offsets.[131] One major question regarding permanence is whether avoided deforestation at one time will continue to be avoided in the future.[132] One of the reasons deforestation projects were not included in the CDM is that some feared carbon sequestered in a forest project would be released to the atmosphere at a future date due to natural or human disturbances, such as fire and future deforestation.[133] This concern prompted the flawed argument that protection of carbon stocks at one point may lead to greater emissions from these carbon stocks in the future.[134] Because of the purported ephemeral nature of conserved forest, current carbon markets such as the CDM issue temporary credits for forestry projects, which eventually expire after a set number of years and must be repurchased.[135] This system has left many potential investors wary.[136]

III. EVALUATION OF PROPOSALS TO CREDIT REDD PROJECTS

Initial proposals to include deforestation in the Kyoto Protocol were shunned.[137] Nevertheless, the potential benefits from implementing a REDD scheme prompted several new proposals for successful application of REDD. The two leading proposals to credit decreases in deforestation are (1) The Compensated Reductions Plan and (2) The European Commission Joint Research Centre Proposal. This section analyzes these proposals and concludes that each proposal is hampered by significant limitations.

131. *Id.* at 50.
132. Sedjo & Sohngen, *supra* note 102, at 6.
133. *See* Schlamadinger et al., *supra* note 47, at 55.
134. *See id.*
135. Mitchell et al., *supra* note 128, at 32.
136. *Id.*
137. Laurence, *supra* note 3, at 20.

A. Compensated Reductions Plan

The most widely regarded proposal[138] for tackling tropical deforestation is the Compensated Reductions Plan.[139] Created by NGO and academic experts, this proposal gained support in the international community due to the Coalition of Rainforest Nations' lobbying efforts at COP 11 in Montreal in 2005.[140] As a result, at COP 11, a team was assembled to prepare and submit a proposal to the Subsidiary Body for Scientific and Technological Advice to study the potential benefits of reducing emissions from deforestation.[141]

The proposed compensated reductions plan awards tradable carbon credits to tropical nations for reducing their emissions from deforestation.[142] Under the compensated reductions proposal, developing nations voluntarily elect to reduce their national emissions from deforestation over a span of years.[143] A nation's reductions are then compared against a national baseline, which is calculated by averaging that nation's annual deforestation rate over a period of time.[144] A nation that successfully reduces its deforestation from the historic baseline during the commitment period receives carbon certificates similar to CERs under the CDM, which may be sold to governments or private investors.[145] Although the decision to participate is voluntary, a nation that receives carbon certificates is deemed to have entered into a binding agreement not to increase deforestation in future comment periods.[146]

With regard to the additionality issue, the proponents of compensated reductions assert that tropical deforestation is increasing internationally, with increases occurring at alarming rates in certain areas.[147] Therefore, it is easy to demonstrate that sustained reductions in deforestation would not occur in the absence of

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138. Moutinho & Schwartzman, *supra* note 15, at 9.

139. *See generally* Santilli et al., *supra* note 18, at 47–49 (discussing how compensated reduction can both reduce substantial carbon emissions from deforestation and encourage developing countries to participate in the Kyoto Protocol framework).

140. Laurence, *supra* note 3, at 21.

141. MADEIRA, *supra* note 75, at 68.

142. Santilli et al., *supra* note 106, at 48–49.

143. *Id.* The initial proposal was for the reductions to occur during the first commitment period under Kyoto. *Id.*

144. *Id.* at 49.

145. *Id.* at 48–49.

146. *See id.* at 49.

147. *See id.* at 49–50.

compensated reductions.[148] The logic follows that any reduction in deforestation rates will be "additional" in that it would not occur in the absence of the compensated reductions plan, as it is very unlikely that deforestation rates at either the national or international levels will decrease without implementing a crediting scheme such as compensated reductions.

As for the permanence issue, the drafters argue that the permanence of carbon credits will be assured by the stipulation that nations that receive tradable carbon credits in one period, and then increase deforestation in the next commitment period, will have to mitigate any increased deforestation as a prerequisite to earning future carbon credits.[149] The compensated reductions plan also proposes a system of "banking" carbon credits, whereby a portion of the earned reductions credits are tradable upon receipt, while another portion of the credits are "banked" and are unable to be traded until a future commitment period.[150] The goal of banking credits is to ensure actual emissions offsets.[151]

One of the main advantages of the compensated reductions proposal is its ability to account for leakage at the national level. Unlike project-based systems such as the CDM, accounting for deforestation at the national level prevents a nation from receiving carbon credits by reducing deforestation in one region of the country while simultaneously increasing deforestation in another region of the country.[152] This national level system does not completely cure the problem of leakage, however, and may create an entirely different leakage problem: international leakage.[153]

The compensated reductions proponents maintain that international leakage is a much larger problem under current Kyoto rules.[154] They contend that because Annex I nations are able to earn credit for maintaining their forest stands at home, the demand for tropical timber increases as a result.[155] Thus, by offering developing

148. *See* Santilli et al., *supra* note 106 (arguing that this state of affairs remains true despite the prediction that deforestation rates will eventually level off and slow as tropical forests disappear).

149. *See id.* at 48–49.

150. *See id.* at 50.

151. *Id.*

152. *See id.* at 49.

153. *See id.* For a discussion of leakage, see generally *supra* notes 119–125 and accompanying text.

154. *See* Santilli et al., *supra* note 106.

155. *See id.*

tropical nations an incentive to reduce their emissions from deforestation, Annex I nations will begin to combat the problem of international leakage by limiting the restrictive influence of the tropical timber market on developing nations outside of Annex I.[156] Moreover, they argue that international leakage will be a problem only if few nations elect to participate in compensated reductions.[157]

There is a small group of tropical nations that likely would not participate in compensated reductions, and these are the nations with high remaining forest cover and low rates of deforestation (HFLD nations).[158] Because HFLD nations have little incentive to participate in a compensated reductions scheme, these nations will presumably face significant pressures from the market drivers of deforestation once other tropical nations begin earning tradable REDD credits.[159] A 2007 study suggested that tropical nations should be divided into four different categories according to tropical forest cover and deforestation rate.[160] The following table illustrates this categorization.[161]

156. *See id.* at 50.

157. *See id.* at 49 (arguing that the theoretical timber market shift from Brazil to Bolivia, which would presumably occur if only Brazil adopted compensated reductions in South America, would not occur if Bolivia also adopted compensated reductions).

158. "HFLD" nations include Panama, Columbia, Democratic Republic of Congo, Peru, Belize, French Guiana, Gabon, Guyana, Suriname, Bhutan and Zambia. *See* da Fonseca et al., *supra* note 21, at 1645.

159. *Id.*

160. *Id.*

161. This table is a modified version of "Figure 1" found in da Fonseca et al., *supra* note 21, at 1645.

	Low Forest Cover (<50%)	High Forest Cover (>50%)
High Deforestation Rate (>0.22%/yr)	**Quadrant I** E.g., Guatemala, Thailand, Madagasgar High potential for REDD credits High potential for reforestation payments under CDM	**Quadrant III** E.g., Papua New Guinea, Brazil High Potential for REDD credits Low potential for reforestation payments under CDM
Low Deforestation Rate (<0.22%/yr)	**Quadrant II** E.g., Dominican Republic, Angola, Vietnam Low potential for REDD credits High potential for reforestation payments under CDM	***Quadrant IV – HFLD Nations*** E.g., Suriname, Gabon, Belize Low potential for REDD credits Low potential for reforestation payments under CDM

According to the aforementioned study, Quadrant I nations are those with less than fifty percent of their original forest cover remaining and a high current deforestation rate (i.e., greater than a 0.22% yearly average).[162] Quadrant I nations have high potential to earn credits for reducing deforestation under a framework such as compensated reductions.[163] These nations also have high potential to earn credits under the CDM through reforestation projects.[164] Quadrant II nations are those nations with less than fifty percent of their original forest cover and a low deforestation rate.[165] These nations have little potential to earn substantial credits under the compensated reductions plan, but a high potential for earning reforestation credits under the CDM.[166] However, as noted in Part I

162. *Id.*
163. *Id.*
164. *Id.*
165. *Id.*
166. *Id.*

of this article, the CDM is an ineffective solution to the tropical deforestation crisis.[167]

Quadrant III nations are those with more than fifty percent of their original forest cover remaining and a high deforestation rate (greater than 0.22% of national forest cover deforested per year).[168] Brazil is an example of a Quadrant III nation.[169] According to the study, Quadrant III nations have a high potential to earn credits under the compensated reductions framework, and a low potential for reforestation payments under the CDM.[170] It seems, however, that this CDM analysis is too broadly construed because a nation the size of Brazil could earn significant credits under the CDM if the CDM were a viable mechanism for large-scale carbon credit distribution.[171]

Finally, Quadrant IV nations, which represent the HFLD nations, have more than fifty percent of their original forest cover remaining and a low deforestation rate.[172] Quadrant IV nations have little potential to earn tradable credits in a system such as the compensated reductions plan that solely compensates based on reductions in deforestation.[173] These nations also have little potential to earn reforestation credits under the CDM.[174]

These HFLD nations represent eighteen percent of stored tropical forest carbon worldwide.[175] Because these nations have little incentive under the proposed compensated reductions plan or the CDM to preserve their forests, HFLD nations are likely candidates for increased deforestation if a REDD crediting scheme is adopted that does not reward: (1) nations that have successfully conserved their forests thus far, or (2) nations that have been successful in recent years in curbing deforestation.[176] The drivers of tropical deforestation are mobile, and international leakage is a serious threat to the effectiveness of any REDD crediting scheme.[177] Therefore, it is important that any REDD scheme issue preventive credits to HFLD

167. *See* da Fonseca et al., *supra* note 21.
168. *Id.*
169. *Id.*
170. *Id.*
171. *See generally id.* at 1645–46.
172. *Id.* at 1645.
173. *See* da Fonseca et al., *supra* note 21.
174. *Id.*
175. *Id.*
176. *See generally id.*
177. *Id.* at 1645.

nations to ensure they have adequate incentive to maintain their forests in the face of increased pressure to harvest due to international leakage.[178]

If the international reference emission rate is set at one-third of the global average deforestation, projections suggest that crediting at a modest $10 per ton of carbon dioxide reduced could be worth approximately $365 million annually for seven of the eleven HFLD nations.[179] Setting the international reference emission rate at one-half the global average deforestation would mean that ten HFLD nations could earn approximately $630 million dollars annually.[180] If the global average rate is used as the baseline, all eleven HFLD nations could profit approximately $1.8 billion annually from preventive credits.[181]

While issuing preventive credits to HFLD nations is an essential tool to combat international leakage, there are still some potential drawbacks. One argument is that issuing preventive credits may flood the carbon market with credits, thus lowering the overall price of the credits, which could diminish many nations' incentives to reduce deforestation.[182] However, when preventive credits are viewed in light of the percentage of forest carbon credits they represent, it is a small portion of the international market.[183] Initial approximations suggest preventive credits will only account for 1.3% – 6.5% of developing nations' credited deforestation reductions.[184] Furthermore, as the global demand for carbon credits increases, inflation of carbon credits becomes less likely to occur.[185]

The primary concern with issuing preventive credits is additionality.[186] Issuing preventive credits may in fact lead to what some critics have dubbed as "hot air."[187] If HFLD nations are issued preventive credits, and sell these credits to Annex I countries that need the credits to meet their regulatory cap obligations, then the total quantity of emissions may actually be larger than would have

178. *See* da Fonseca et al., *supra* note 21, at 1645–46.
179. *Id.*
180. *Id.*
181. *Id.*
182. *Id.*
183. *See id.*
184. da Fonseca et al., *supra* note 21.
185. *Id.*
186. *See* MADEIRA, *supra* note 75, at 35.
187. *Id.* at 29.

otherwise been allowed.[188] That is, if Annex I countries are allowed to pollute over their designated cap by purchasing these preventive credits, while at the same time, the developing nation is not actually decreasing emissions from deforestation below their business as usual rate, there is no net reduction in emissions.[189] However, this problem must be considered relative to any plan that simply credits reduced deforestation (e.g., compensated reductions).

While there may be a problem obtaining net emission reductions with preventive credits, the same is true if international leakage takes place. For example, if Brazil adopts compensated reductions, and the market drivers of deforestation simply leak to an HFLD nation such as Columbia, there is no net reduction in emissions. Given this same scenario, when both Brazil and Columbia have a financial incentive via carbon credits to limit deforestation, both nations will presumably take proactive measures to ensure that deforestation is sufficiently reduced and regulated. Thus, the market drivers of deforestation will not have a favorable environment in which to continue deforestation efforts.

The problem with additionality and preventive credits can be further ameliorated by capping the quantity of preventive credits that are tradable in any one commitment period. Capping the trade of preventive credits in each commitment period limits the number of credits that do not represent actual carbon "offsets." This approach mandates that the vast majority of traded REDD carbon credits represent actual reductions in carbon dioxide emissions from nations that reduce their emissions from deforestation. If an HFLD nation can only trade a certain portion of its preventive credits during any one commitment period, the effects of this "hot air" will be far less significant.

Finally, participating governments in the REDD crediting scheme should receive adequate monetary compensation from trading credits to address the problems associated with deforestation in very poor regions of a country (e.g., slash and burn farming), where residents exploit forests out of necessity.[190] For example, portions of the compensation earned from the sale of carbon credits could be

188. *Id.* at 29–30.

189. *Id.*

190. *See* Thomas P. Tomich et al., *Balancing Agricultural Development and Environmental Objectives: Assessing Tradeoffs in the Humid Tropics, in* SLASH-AND-BURN AGRICULTURE: THE SEARCH FOR ALTERNATIVES 415, 437 (Cheryl A. Palm et al. eds., 2005).

applied to economic development projects in the poorer rural regions of Brazil.

B. European Commission Joint Research Centre Proposal

Another proposal to address emissions from tropical deforestation is the European Commission Joint Research Centre ("JRC") proposal.[191] Like compensated reductions, this proposal addresses deforestation at the national level.[192] This plan differentiates between intact and non-intact forests, as it accounts for both deforestation and forest degradation, which is referred to as forest "conversion."[193] Like compensated reductions, the JRC proposal establishes national baselines.[194] However, in addition to national baselines, the JRC proposal also establishes a global conversion baseline.[195] The reason for establishing two baselines is to reduce forest conversion in nations where significant deforestation and degradation is occurring, and to prevent deforestation and degradation in nations where it has yet to occur on a major scale.[196] Thus, the international baseline is used to distinguish nations with low forest conversion rates from those with high forest conversion rates.[197] The JRC proposal implements satellite technology to monitor forest conversion.[198] In calculating carbon emission reductions, the carbon stock of non-intact forests is considered to contain half of the carbon stock of intact forests.[199]

The JRC proposal creates two separate accounting systems: one system for nations with high conversion rates, and another for nations with low conversion rates. The dividing line that differentiates the two groups is one-half the global conversion rate. If a nation's national conversion rate is higher than the global conversion rate

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191. Frederic Achard et al., *Accounting for Avoided Conversion of Intact and Non-Intact Forests: Technical Options and a Proposal for a Policy Tool* 2, (European Commission Joint Research Centre discussion paper), *available at* http://www.cifor.cgiar.org/NR/rdonlyres/D0207F59-8D5D-4362-A706-46AEE48619AA/0/JRCProposal.pdf.

192. *Id.*; *see also* Danilo Mollicone et al., *An Incentive Mechanism for Reducing Emissions from Conversion of Intact and Non-intact Forests*, 83 CLIMATIC CHANGE 477 (2007) (addressing the European Commission Joint Research Centre proposal).

193. Achard et al., *supra* note 192, at 2.

194. *Id.*

195. *Id.*

196. *Id.*

197. *Id.*

198. *Id.*

199. Achard et al., *supra* note 192, at 2.

baseline, then that nation must reduce its conversion rate to earn tradable credits. Likewise, if a nation's conversion rate is below the global conversion baseline, then that nation must continue to maintain its conversion rate below the global baseline to earn tradable credits. Once a nation is placed into one of these two categories, its forests are valued and placed into one of the following sub-categories: (1) intact to non-intact, (2) intact to non-forest, or (3) non-intact to non-forest. A nation's forest status is paired with its conversion rate, and this information is used to calculate the nation's overall conversion rate over the commitment period, which determines the type of tradable carbon credits that are issued.[200]

The credits issued are temporary and are issued to participating nations on an annual basis.[201] The goal of this approach is to avoid the permanence problem, as the drafters were concerned about the volatility of preserved carbon via tropical forests.[202] Carbon preserved in rainforests is "volatile" because preserved carbon can be released through illegal logging, wildfires, and increased logging in later commitment periods.[203]

One drawback of the JRC proposal is its relative complexity compared to the compensated reductions plan. While the JRC proposal's distinction between intact and non-intact forests makes sense, it may lead to some confusion in the initial pilot runs of any forest carbon credit system. Moreover, it could be marred by the same cumbersome procedural requirement red tape that has rendered the CDM ineffective. Perhaps the international community would be better served by the implementation of the JRC or a JRC-like plan in later commitment periods after a REDD crediting scheme has been implemented. This would provide time to gain a sense of how such a plan would function in actual practice. Nevertheless, the JRC proposal contains an element that is essential to any effective REDD crediting proposal—crediting nations that have effectively conserved their forests and do not have high deforestation rates (i.e., HFLD nations).

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200. *Id.* at 3.

201. *Id.*

202. *See id.*

203. *See id.* ("[T]hese [credits] should be considered only as temporary preserved carbon, because of the non-permanent nature of such preserved carbon.").

IV. THE HYBRID COMPENSATED REDUCTIONS AND PREVENTIVE CREDITS PROPOSAL

This section describes the components of a hybrid proposal that integrates the advantages of the two proposals addressed in Part III. It discusses how this new plan responds to the challenges in crediting reductions in deforestation discussed in Part II, how such credits could be financed, and the legal framework under which this proposal could be implemented to ensure optimal impact.

A. Components of the Proposal

This plan combines elements from the compensated reductions and the JRC proposals. Like compensated reductions, entry into the hybrid plan is voluntary for any developing tropical nation. However, after a nation implements the hybrid plan and earns tradable credits for initial reductions or preventive measures, it is then bound for future commitment periods. Under the hybrid plan, an international baseline is set from the global tropical deforestation rate, calculated by using each tropical nation's deforestation rate over a recent span of years (e.g., 1995–2005) to create a global deforestation average. The hybrid plan accounts for deforestation, not forest conversion. Thus, it requires the parties to the treaty to determine what level of forest degradation is to be monitored (e.g., selective logging, clear-cut logging, slash and burn tactics, and land conversion) as well as the level of disturbance that will constitute "deforestation" for purposes of monitoring and accounting.

Like the baseline set in the JRC proposal, this international baseline will be set below the global deforestation average for developing tropical nations. For example, it could be set at one-half of the global tropical deforestation average. Along with the international baseline, participating nations will also set a national baseline determined by the particular nation's domestic deforestation rate over a set period. To ensure uniformity, each nation's domestic deforestation rate is measured over the same span of years from which the international average is calculated.

After the international and domestic baselines are set, participating nations would be placed into one of two categories. *Category I* consists of those nations whose domestic deforestation rate is higher than the international baseline. *Category I* nations will operate on the compensated reductions system. *Category II* consists of those nations whose domestic deforestation rate is lower than the

international baseline. These nations will operate on a preventive credits system.

Category I nations will be assigned a national baseline based on the average of their past deforestation rates over a set period. If a nation successfully reduces its deforestation rate below its national baseline during the commitment period, the nation will be issued tradable carbon certificates equivalent to the amount of carbon emissions reduced. The amount of credits allotted to a *Category I* nation for reductions below the baseline should be determined by the participating nations. As an example, *Category I* credits could be determined according to the quantity of measurement units (e.g., acres) by which a particular nation reduced its deforestation rate from its baseline yearly average. Thus, each measurement unit will represent a certain quantity of stored carbon. Because tropical forests differ globally, and one acre of forest in one nation may store more carbon than one acre of forest in another nation,[204] measurement units could be adjusted per nation to ensure each carbon credit represents the same amount of net carbon reduction.

Category II nations will operate on a preventive credits system. Under this system, a nation's forests will be measured to determine how much carbon is stored therein. A nation's forests will be valued by assigning a plot of land (e.g., an acre) an approximate amount of stored carbon, and credits will be issued in each commitment period according to the quantity of carbon preserved (i.e., any accounted tract of forest that has a level of forest disturbance below the monitoring level).[205]

Baselines may need to be readjusted to ensure that they accurately reflect the current status of tropical deforestation in a particular country. This approach makes certain baselines reflect realistic targets for each nation. For example, a *Category I* nation that is not successful in decreasing deforestation during the first commitment period, and increases its national deforestation rate, may no longer have any incentive to decrease deforestation. The reason for this phenomenon is that as a nation falls from its national baseline, it is less likely to be successful in achieving its target reduction to earn tradable credits. Consequently, the market drivers

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204. *See generally* Robert W. Malmsheimer et al., *Forest Management Solutions for Mitigating Climate Change in the United States*, 106 J. FORESTRY 115–173 (2008).

205. As is the case with *Category I* nations, it must also be determined for *Category II* nations what minimum disturbance will constitute "deforestation" for purposes of monitoring and accounting preventive credits.

of deforestation will be more powerful, especially in the short-term, for these nations, which significantly diminishes any further incentive to participate in the hybrid plan. If baselines are adjusted, however, nations whose initial baseline target has become unattainable will still have an incentive to decrease deforestation in future commitment periods.[206]

Conversely, a *Category I* nation that successfully implements the hybrid plan may operate on a baseline much lower than its initial national baseline. Consequently, the credits this nation receives in subsequent commitment periods will not reflect any actual reduction in carbon emissions, which will cause additionality concerns.[207] Thus, while it is essential to maintain national baselines at a constant level for several commitment periods, it may be necessary to reevaluate them to ensure the baselines represent realistic targets for each nation.[208]

The international baseline should be adjusted every two commitment periods (approximately every 10 years), as decreasing or increasing trends in tropical deforestation may increase or reduce the global average. Changes in the international baseline are important, as some *Category I* nations may decrease deforestation to rates below the international baseline. Under these circumstances, *Category I* nations will be re-designated as *Category II*, and will operate on the preventive credits system.[209] For nations initially designated as *Category II*, these nations may increase their deforestation rate above the international baseline. Under these circumstances, *Category II* nations may be re-designated as *Category I* nations.

B. Addressing Monitoring, Permanence, Additionality, and Leakage

Like other plans that credit tropical nations for REDD activities, the hybrid plan must address monitoring, permanence, additionality, and leakage. For monitoring, satellite and radar technology is

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206. *See* MADEIRA, *supra* note 75, at 40.

207. *See id.*

208. Baseline adjustment could occur either on an as needed basis determined by the governing parties to a treaty, or more preferably, on a set baseline reevaluation system, where baselines are reevaluated, for example, every ten years or two comment periods.

209. At first glance this may seem disadvantageous to a particular *Category I* nation which has been very successful in decreasing deforestation. However, due to baseline adjustment, this nation's baseline would be adjusted making it more difficult to earn as many credits. Therefore, shifting a nation to the preventive credits system may actually prove to be more profitable for that nation in terms of credits earned.

becoming so advanced today that even selective logging projects can be monitored.[210] Moreover, computer modeling is available to track deforestation trends.[211] At the 2006 UNFCCC Subsidiary Body for Scientific and Technological Advice REDD workshop, experts concluded that the remote sensing technology that currently exists is sufficient to adequately measure deforestation.[212]

The biggest challenge with monitoring is that many nations cannot afford the necessary technology to effectively monitor their tropical forests.[213] The most effective way to combat this financial problem is through international funding. International funds can be implemented to aid developing nations in acquiring the necessary infrastructure to make the hybrid plan a reality. One potential source for international funding is the Global Environment Facility (GEF). The GEF is administered by the World Bank, the United Nations Environment Programme, and the United Nations Development Programme.[214] The GEF has been the primary mechanism for financially assisting developing nations in addressing global environmental problems.[215] The GEF's funding is restricted to funding the costs of implementing measures to address six international environmental problems: climate change, ozone depletion, conservation of biological diversity, protection of international waters, desertification, and organic pollutants.[216] The GEF also funds incremental activities that address land degradation, desertification, and deforestation.[217] In addition to addressing global environmental problems, the GEF provides the primary source of funding for the Climate Change Convention.[218] The hybrid plan meets several of these funding parameters, and is thus a worthy candidate for GEF funding. Importantly, however, the hybrid plan must operate through the UNFCCC to be eligible for GEF funding.[219]

Another potential source of funding for the hybrid plan is the World Bank's Forest Carbon Partnership Facility (FCPF), which was

210. Mitchell et al., *supra* note 128, at 33.
211. *Id.* at 19.
212. MADEIRA, *supra* note 75, at 31.
213. *See infra* Part II. A.
214. Hunter et al., *supra* note 9, at 1584.
215. *Id.* at 1583.
216. *Id.* at 1584.
217. *Id.*
218. *Id.*
219. *Id.*

launched at the December 2007 COP in Bali, Indonesia.[220] This $350 million fund is designed in part to assist developing nations obtain the required infrastructure needed to participate in REDD markets.[221] The World Bank, however, is not looked upon favorably by all, especially by many environmental organizations. For example, environmentalists have criticized the World Bank for being one of the key supporters of Amazon cattle ranching.[222] Therefore, while the World Bank is unveiling plans to the UN to curb deforestation,[223] it is at the same time funding one of the main industries driving deforestation in the Amazon.[224] Nevertheless, the World Bank is currently the most viable source of funding for many developing nations to establish adequate monitoring systems.[225] Importantly, funding from either the GEF or the FCPF should only be temporary. Once a nation earns tradable carbon credits under the hybrid plan, these nations should use the income generated from these credits to fund the costs of monitoring.

The hybrid plan ensures permanence of credits by requiring *Category I* nations that have received tradable credits for reductions in one commitment period and have subsequently increased deforestation in a later commitment period to make up for this increased deforestation before any future credits will be issued. Thus, the amount of increased deforestation will be a mandatory target for the nation in the next commitment period.[226] This method ensures that nations are unable to profit by earning and trading credits for conserving an area of forest and then later deforesting the area. Permanence is a different issue for *Category II* nations. In these nations, any increase in deforestation will simply result in fewer tradable carbon credits.

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220. MADEIRA, *supra* note 75, at 17.

221. Indonesia has applied for funding under this program and is developing domestic REDD regulations that are expected to be released in 2009. David Fogarty, *Indonesia Applies for World Bank Forest CO2 Scheme,* Carbon Offsets Daily, Mar. 4, 2009, http://uk.reuters.com/article/idUKSP394051.

222. Daniel Howden, *World Bank Pledges to Save Trees...Then Helps Cut Down Amazon Forest*, INDEPENDENT, Jan. 13, 2008, *available at* http://www.independent.co.uk/environment/climate-change/world-bank-pledges-to-save-trees-then-helps-cut-down-amazon-forest-769997.html.

223. *Id.*

224. *Id.*

225. *Id.*

226. *See generally* Moutinho et al., *supra* note 18.

A key issue is how to treat a nation that loses an expanse of tropical forest due to non-anthropocentric means, such as a naturally occurring fire. This phenomenon is common in tropical nations in years of drought, and for areas of forest near land that has been cleared by humans for agricultural activities or logging.[227] Because tropical forest fires seem to be positively correlated with human deforestation and degradation of forested regions,[228] it seems the most effective way to account for tracts of forest lost to fire is simply to calculate that area lost into the nation's deforestation rate. This approach will also prevent nations from fraudulently burning forest to clear land for other activities.

The tradeoff between additionality and leakage lies at the heart of the hybrid plan. Simply crediting REDD activities at the national level will inevitably lead to international leakage.[229] On the other hand, issuing preventive credits to HFLD nations poses additionality issues, as this may result in "hot air," with no overall net reduction in carbon emissions resulting from the trade of preventive credits. However, when viewing this problem in relation to the compensated reductions plan, the potential for hot air resulting from the trade of preventive credits is less an issue of additionality and more a problem of international leakage. The benefits of issuing preventive credits outweigh the drawbacks. Measures can be taken to reduce the amount of hot air in any one commitment period. For example, restricting the amount of preventive credits that may be traded in a particular commitment period reduces the potential for hot air. With an appropriate, restricted level of credits in the market, *Category II* nations will earn enough compensation to withstand the pressures of international leakage, while developed nations will not be able to purchase a substantial amount of these preventive credits because of the preventive credit trading caps per comment period. The most credits tradable on the carbon market at any one time from the hybrid plan will be those traded by *Category I* nations, which guarantees actual net reductions in carbon emissions from decreased deforestation.

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227. Rhett A. Butler, *2007 Amazon Fires Among Worst Ever*, MONGA BAY, Oct. 22, 2007, http://news.mongabay.com/2007/1021-amazon.html.

228. Ane Alencar et al., *Carbon Emissions Associated with Forest Fires in Brazil*, *in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 23, 24 (Paulo Moutinho & Stephan Schwartzman eds., 2005).

229. *See* MADEIRA, *supra* note 75, at 47.

Therefore, hot air from preventive credits is less of a problem than international leakage, as hot air can be adequately monitored and regulated by the markets. International leakage, on the other hand, cannot be adequately monitored because it is not a component of the emissions trading scheme, but is instead a reaction to it, thereby limiting the regulated community's control over the problem.

C. Which Legal Framework?

Another critical issue is the legal framework under which the hybrid plan would operate. This topic has been discussed in the context of compensated reductions, and that discussion is relevant when thinking about potential legal frameworks for the hybrid plan. One option that has been explored is amending the CDM to credit reductions in deforestation.[230]

The main advantage of amending the CDM is that it is relatively straightforward, and it operates within an existing framework.[231] Theoretically, the hybrid plan could be incorporated into the CDM by simply amending the Marrakesh Accords[232] to allow land use, land use change, and forestry (LULUCF) projects.[233] As simple as it may sound, incorporating the hybrid plan into the CDM would not work.

First, the Marrakesh Accords, the process during which the CDM was established, involved extensive negotiation.[234] Attempting to fit the hybrid plan into the CDM would undermine and potentially undo these fragile terms.[235] In the formative negotiations of the CDM, accounting for LULUCF was a controversial issue, and the negotiating parties struggled to reach a satisfactory agreement.[236] Opponents of incorporating LULUCF into the CDM argued that because the carbon reductions due to forestry projects could not be accurately measured, they did not satisfy Article 12(5)(b) of the

230. Annie Petsonk, *Rewarding Reductions, Realizing Results: Legal Options for Making Compensated Reduction a Reality*, *in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 119. 121 (Paulo Moutinho & Stephan Schwartzman eds., 2005), *available at* http://www.edf.org/documents/4930_TropicalDeforestation_and_ClimateChange.pdf.

231. *Id.*

232. *See id.* at 119.

233. *See id.*

234. *See id.* at 121.

235. *Id.*

236. Silveira da Rocha Sampaio, *supra* note 1, at 644.

Kyoto Protocol.[237] Second, the CDM is a project-level mechanism, and the hybrid plan operates on the national and international levels.[238] Third, the Marrakesh Accords declared that that LULUCF projects cannot exceed 5% of base year emissions for the Annex I country in the first commitment period.[239] If a similar cap on LULUCF activities is implemented in the next commitment period, it would severely limit the extent to which developing nations may participate in the carbon market, and would not allow the hybrid plan to operate on a large enough scale to fully address the tropical deforestation problem.[240] Fourth, amending the CDM would require that participating parties must be parties to Kyoto, and this may disqualify some potential participants.[241] Finally, the CDM's strict additionality requirement[242] would nullify any plan to incorporate preventive credits, thus ruling out the hybrid plan as a possible option.

A second and more viable legal option would be to implement the hybrid plan into Kyoto's post-2012 successor when such an instrument is developed. Since the hybrid plan focuses on deforestation and its relation to climate change, this plan would likely garner support under the UNFCCC framework. The hybrid plan could easily be incorporated into the successor to the Kyoto Protocol because many of the terms that make incorporating the hybrid plan into Kyoto difficult could be amended. Assuming that all of the current parties to Kyoto ratify the post-2012 agreement, another benefit of this option is that there would already be a significant base of nations that are parties to the agreement, which would ensure a significant market for the credits issued under the hybrid plan.

A third option is to create an entirely new protocol under the UNFCCC, or perhaps even an agreement outside of the climate change framework (e.g., the UN Forum on Forests).[243] Operating

237. The argument was that Article 12(5)(b) requires that reductions be real, measurable, and long-term in order to receive CDM certification, none of which was guaranteed by forestry projects. *Id.* at 656.

238. *See* Petsonk, *supra* note 230, at 121.

239. *Id.*

240. *See id.*

241. *Id.*

242. *See* Axel Michaelowa, *Determination of Baselines and Additionality for the CDM*, *in* CLIMATE CHANGE AND CARBON MARKETS: A HANDBOOK OF EMISSION REDUCTION MECHANISMS 289–304 (Farhana Yamin ed., 2005), *available at* http://www.hm-treasury.gov.uk/d/Michaelowa_Determination.pdf.

243. Petsonk, *supra* note 230, at 121–22.

completely outside of the Kyoto or Kyoto-successor framework would have several advantages. One advantage is that nations that have not become parties to Kyoto may be more willing to adopt this new treaty.[244] The United States is a prime example of such a nation. However, one major disadvantage to this option is that it does not guarantee parties access to the carbon markets.[245] The existing carbon markets are essentially a product of Kyoto.[246] If the emissions reductions credits issued through the hybrid plan are not accepted under the Kyoto or Kyoto-successor framework, there will be little demand for these credits. If the parties to Kyoto cannot use the emissions credits issued under the hybrid plan to meet their emissions cap obligations, it would be a major blow to a new agreement outside the Kyoto system. Furthermore, it is impossible to predict how many nations would ratify this new treaty. Therefore, such an accord does not guarantee the same consensus that a post-Kyoto agreement is likely to have.

CONCLUSION

Tropical rainforest conservation is an essential step in responding to the global climate change crisis. Given current rates of tropical deforestation, the time to act is now. Any post-2012 climate change treaty or forest conservation treaty must address emissions from tropical deforestation if significant reductions in global carbon dioxide emissions are to be achieved. Moreover, implementing measures and incentives to preserve the world's tropical forests offers benefits that extend far beyond the value that such preservation provides in reducing global carbon emissions from avoided deforestation and forest degradation.

Under the existing Kyoto framework and the CDM mechanism, there is no opportunity to earn credits for avoided deforestation. The hybrid plan proposed in this article is a valuable first step in addressing this problem. The most significant challenge for any crediting system for reduced deforestation is the tradeoff between additionality and leakage. The hybrid plan does not completely resolve this issue, but the benefits gained by eliminating potential international leakage outweigh potential additionality issues.

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244. *Id.* at 122.

245. *Id.* (explaining that the "currency" of any new agreement may not be accepted by the UNFCCC markets).

246. *See id.*

Moreover, the hybrid plan could be readily incorporated into the post-Kyoto regulatory framework—and thereby capitalize on the consensus reflected in the existing Kyoto regime—by institutionalizing REDD as a component of a mandatory regulatory scheme to combat global climate change.