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SENIOR THESIS APPROVAL

This Honors thesis entitled

“Eager to Offset: A Case Study in Carbon Offset Forestry”

written by

Jason Smith

and submitted in partial fulfillment of the
requirements for completion of the
Carl Goodson Honors Program
meets the criteria for acceptance
and has been approved by the undersigned readers.

(Name) thesis director

(Name) second reader

(Name) third reader

honors program director

April 15, 2008

OUACHITA BAPTIST UNIVERSITY

**Eager to Offset: A Case Study in
Carbon Offset Forestry**

A THESIS PAPER SUBMITTED TO

DR. AMY SONHEIM

TO FULFILL PARTIAL REQUIREMENTS OF
THE CARL GOODSON HONOR'S PROGRAM

BY

JASON SMITH

ARKADELPHIA, ARKANSAS

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Introduction

It is unlikely Professor Freeman Dyson could have predicted that his 1976 idea intended to combat a climate change disaster would receive such radically mixed reviews by experts in many fields.¹ Presently called “carbon offset forestry,” Dyson’s idea has evolved into an industrially systematized yet federally unregulated method used primarily by the business sector to mitigate carbon dioxide emissions.² It has become a practice both prized by some entrepreneurs yet repudiated by many in scientific and economic circles.³ Intended as a “stopgap” method to delay the consequences of global climate change, carbon offset forestry is promoted as a temporary solution to global warming. But whether carbon offset forestry acts as an accurate scientific technique of countering global warming continues to be debated.⁴

Global warming has rapidly evolved from being an issue only known by top scientists in the 1970s to becoming a widely-discussed issue in current world politics and popular culture. Al Gore’s documentary *An Inconvenient Truth* played a major role in presenting the facts of global warming to a large audience, and won the 2006 Oscar for Best Documentary Feature.⁵ Climate change has also been confirmed in scientific circles. According to a June 2007 article in the Proceedings of the National Academy of Sciences, global carbon dioxide emissions rates have

¹ Dyson, Freeman J. “Can We Control Carbon Dioxide in the Atmosphere?” *Energy* 2 (1977): 288.

² Harvey, Fiona, and Stephen Fidler. “Industry caught in carbon ‘smokescreen.’” *Financial Times* (2007).

³ Lohmann, Larry. 1999. *The Dyson Effect: Carbon ‘Offset’ Forestry and the Privatisation of the Atmosphere*. The Corner House, Briefing 15. <http://www.thecornerhouse.org.uk> (accessed September 12, 2007); Velasquez-Manoff, Moises. “Do Carbon Offsets Live Up to their Promise?” *The Christian Science Monitor* (2007); Harvey, Fiona, and Stephen Fidler. “Industry caught in carbon ‘smokescreen.’” *Financial Times* (2007); Bermann, Fleming. 2008. “Putting the ‘carbon neutral’ claim to the test.” http://www.carbon-info.org/carbonnews_072.htm (accessed, January 20, 2008); Kay, John. “Key to carbon trading is keep it simple.” *Financial Times* (2006). <http://search.ft.com> (accessed March 17, 2008).

⁴ Lohmann, Larry. 1999. *The Dyson Effect*.

⁵ Halbfinger, David M. 2007. “Pouring Cold Water On a Hot Question.” *New York Times* (2007). <http://query.nytimes.com/> (accessed January 22, 2008).

been rising at exponential rates since 1990.⁶ Prior to the June 2007 G8 summit, the thirteen national science academies belonging to the G8+5 nations released a joint declaration concluding that “climate change [is] occurring and [can] be attributed mostly to human activities.”⁷ The data supporting the rise of carbon dioxide emissions is the most recent in a large collection of data gathered by scientists which further establishes global warming as a scientifically grounded theory. Current unity in the international scientific community on global warming shows the issue deserves serious and viable policy answers.

A definition of terms is necessary in order to proceed. According to Encyclopædia Britannica Online, the “greenhouse effect” is the warming of the Earth's surface and troposphere (the lowest layer of the atmosphere), caused by the presence of water vapor, carbon dioxide, methane, and certain other gases in the air.⁸ Global warming refers to the global increase in temperature caused as a result of the greenhouse effect. These terms can sometimes seem to be used interchangeably, but it is necessary to understand them as separate concepts.

Carbon sequestration is the broader term referring to various processes executed to “sequester” or remove carbon dioxide from the atmosphere. Carbon can be stored in the soil, the ocean, and as in carbon offset forestry, in trees and vegetation. Carbon offset forestry is the act of paying an outside actor to grow trees and plants to “offset” or neutralize one’s carbon dioxide emissions. The scientific theory hypothesizes that through the process of photosynthesis, carbon released in the atmosphere (primarily by solid fuels such as coal, liquid fuels such as petroleum, and gaseous fuels such as natural gas) is absorbed by plants and does not reach the atmosphere

⁶ Raupach, Michael. “Global and regional drivers of accelerating CO₂ emissions.” *Proceedings of the National Academy of sciences USA* 104 (2007): 1-6.

⁷ “Joint science academies’ statement of G8+5 countries on climate protection and energy efficiency.”

⁸ Encyclopædia Britannica Online, online edition. s.v. “greenhouse effect.” <http://www.britannica.com> (accessed November 7, 2007).

which acts as a greenhouse gas thus contributing to global warming.⁹ Also relevant to this paper is the concept of a “carbon sink.” According to Webster's *New Millennium Dictionary of English*, a carbon sink is a natural environment that stores more carbon than is released thus offsetting greenhouse gases.¹⁰

The two major approaches employed by governments to respond to climate change include the voluntary approach and state-led efforts. The “voluntary carbon market” is defined as a marketplace for selling and purchasing carbon offsets that is not regulated or made compulsory by federal policy or a legally-binding agreement (such as the Kyoto Protocol).¹¹ The policy of the United States government has expressed strong support for a voluntary market approach since the Clinton Administration. The Energy Policy Act of 1992 is one of the first efforts to engage the voluntary carbon offset market.¹² The most recent program to encourage the voluntary approach is the Climate Vision Plan carried out under the Bush Administration.¹³ State-led efforts include the Kyoto Protocol which most developed states have signed this legally-binding agreement and embraced this approach.

Recently, the considerable investment in the carbon offset forestry model would seem to indicate its worldwide recognition as a preeminent solution to preventing global warming and countering the greenhouse effect. According to carbon market analysts at New Carbon Finance and Ecosystem Marketplace, the voluntary carbon forestry offset market, providing businesses with “carbon neutral” options, rose immensely in 2006 with the voluntary carbon offset market

⁹ Raupach, Michael. “Global and regional drivers of accelerating CO₂ emissions.” *Proceedings of the National Academy of sciences USA* 104 (2007): 2-3.

¹⁰ Webster's *New Millennium Dictionary of English*, Preview Edition, version 0.9.7., s.v. “carbon sink.”

¹¹ Hamilton, Katherine, Ricardo Bayon, Guy Turner, and Douglas Higgins. *State of the Voluntary Carbon Markets 2007: Picking Up Steam*. Ecosystem Marketplace (2007): 12.

¹² U.S. Department of Energy. “Executive Summary: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005.” <http://www.epa.gov/climatechange/emissions/usinventoryreport.html> (accessed November 9, 2007).

¹³ Climate Vision. “Program Mission.” <http://www.climatevision.gov/mission.html> (accessed March 27, 2008).

being worth \$91 million in 2006.¹⁴ Symbolizing the recent surge in “carbon offset” activities, the New Oxford American Dictionary selected a term in 2006 for “word of the year” that epitomized the global-warming-themed year: “carbon neutral.”¹⁵

Groups such as Silverjet Airlines,¹⁶ HSBC,¹⁷ Ben and Jerry’s Ice Cream,¹⁸ and even musical groups such as Dave Matthews Band¹⁹ and Pearl Jam²⁰ have taken measures to become “carbon neutral” or ensure that their carbon dioxide releases are balanced with carbon offset activities such as forestry. Vatican City became the first carbon neutral state in July 2007 through the reforestation of a part of the Bükk National Park, Hungary, to be officially named the Vatican Climate Forest.²¹ The idea of purchasing carbon offsets to counter carbon emissions has also been a topic of discussion by the United States House of Representatives. In November 2007, the House bought \$89,000 worth of carbon offsets through the Chicago Climate Exchange (CCX) to compensate for carbon emissions for nearly half of the capitol building.²²

But carbon offset forestry has been met with skepticism by many observers. In his 2006 article in *The New Internationalist*, Adam Ma’anit considers the purchasing of offsets as a rationalization to continue consuming oil without personal reduction a “seductive argument.”²³ In an October 6, 2006, article of *The Guardian*, columnist George Monbiot considers carbon

¹⁴ Hamilton, Katherine, Ricardo Bayon, Guy Turner, and Douglas Higgins. *State of the Voluntary Carbon Markets 2007: Picking Up Steam. Ecosystem Marketplace* (2007): 4.

¹⁵ Rogers, Paul. “‘Carbon neutral’ enters lexicon.” *The Oakland Tribune*, (2007). <http://findarticles.com/> (accessed October 26, 2007).

¹⁶ Revkin, Andrew C. “Carbon Neutral Is Hip, but Is It Green?” *The New York Times* (2007). <http://www.nytimes.com> (accessed October 27, 2007).

¹⁷ BBC News. “HSBC bank to go carbon neutral.” *BBC News* (2004). <http://news.bbc.co.uk> (accessed November 1, 2007).

¹⁸ Bennet, Drake. “Have yourself a carbon-neutral Christmas.” *The Boston Globe* (2006). (accessed October 26, 2007).

¹⁹ Ibid

²⁰ Schiermeier, Quirin. “Special report: Climate credits.” *Nature* 444 (2006): 976.

²¹ Rocca, Francis X. “The Holy See is Going Green.” *Religion News Service* (2007).

²² Fahrenthold, David A. “Assuaging Guilt or Saving the Planet? The impact of the House of Representatives’ carbon offsets is hard to measure.” *The Washington Post Weekly Edition* (2007).

²³ Ma’anit, Adam. “If You Go Down to the Woods Today...” *New Internationalist* 391 (2006). <http://www.newint.org> (accessed October 30 2007).

offsets “indulgences” with which to pay for our “climate sins.”²⁴ The recent surge in the voluntary carbon offset market does not indicate its universal acceptance as a solid economic theory in practice. Recent investigations have made public some of the flaws within the industry which reveals an overall lack of oversight of the activity.²⁵ Originally, while scientific research in the 1980’s supported the notion of carbon offset forestry, political and economic implications of the carbon offset model have discredited the “simple and so easy” label it has been given.²⁶

Larry Lohmann stands as a significant contributor to social and political arguments against carbon offset forestry. Lohmann critiques offset forestry as “carbon imperialism.” He explains that “Northern countries,” or more developed countries, have tended to place offset forestry projects in “Southern countries,” or developing countries. Lohmann contends that companies pursue projects in developing countries to save on cost, and that this practice is degrading and shameful towards the developing world. He argues that “[r]esponsibility for corporate decisions and state coercion of the rural poor is diffused across the affluent sections of society, who are isolated from those who will take the brunt of carbon ‘sequestration.’” Lohmann’s disapproval of pursuing projects in developing countries rests on the fact that poor farmers and laborers plant trees to offset the greenhouse gases of the wealthy. His perspective, in combination with the perspectives of other experts in scientific and economic fields, will be used in this essay to present the problems of the voluntary carbon offset forestry industry.²⁷

“Eager to Offset” aims to look critically at whether businesses in general are engaging in carbon offset forestry as a genuine environmental service or as an investment opportunity

²⁴ Monbiot, George. “Paying for our sins.” *The Guardian* (2006). <http://www.guardian.co.uk/> (accessed October 30, 2007).

²⁵ Tribble, Sarah Jane. “Carbon ‘offset’ market lacks standards, oversight.” *San Jose Mercury News* (2007). <http://www.mercurynews.com> (accessed October 27, 2007).

²⁶ Stevens, William K. 1989. “To Halt Climate Change, Scientists Try Trees.” *New York Times* (1989). <http://query.nytimes.com/> (accessed March 17, 2008).

²⁷ Lohmann, Larry. 1999. *The Dyson Effect*.

benefiting little more than a group's environmental reputation. One industry which has recently engaged in carbon offset forestry as a part of the voluntary carbon market is the electric utility industry. PowerTree Carbon Company LLC was initiated in April 2004 for the purpose of reforesting 3,609 acres of bottomland hardwood forest in the Lower Mississippi Alluvial Region in Arkansas and Louisiana.²⁸ Twenty-five electric utilities have founded PowerTree as a limited liability company, jointly investing a total of \$3 million to fund reforestation projects.²⁹ Of the twenty-five utility companies that have invested in PowerTree, thirteen are included in the Forbes "World's 2000 Largest Public Companies" list and three are on Forbes "400 Best Big Companies" (Exelon, Dominion Resources, First Energy).^{30 31}

This paper seeks to evaluate the PowerTree carbon offset project as a case study. It is in the interests of the general public to understand the motivations behind PowerTree Carbon Company LLC and its efforts to plant over 3600 acres of hardwood bottomland forest in Arkansas and Louisiana. Because the scientific community has not yet fully recognized carbon offset forestry as a viable option and an elegant model in combating climate change, it is necessary to identify why PowerTree LLC was organized as a company by members of the electric utility industry and whether the voluntary actions of the business sector is the best approach in preventing climate change. In order to detail the dialogue in scientific, economic, and political circles, this study references articles in prominent international publications in order to understand the background of offsetting and the formulation of opinions on the practice.

²⁸ PowerTree Carbon Company LLC (April 19, 2004). "Power Companies Team Up with Public, Private and Nonprofit Organizations to Manage Greenhouse Gases, Restore Critical Habitat" (PDF). Press release.

²⁹ Ibid

³⁰ DeCarlo, Scott, ed. 2007. The World's 2000 Largest Private Companies. Forbes Magazine. <http://www.forbes.com> (accessed March 17 2008).

³¹ DeCarlo, Scott, ed. 2007. The 400 Best Big Companies. Forbes Magazine. <http://www.forbes.com> (accessed March 17 2008).

While the efforts of these companies are not without certain benefits, consumers should be vigilant of the motives companies give in participating in the voluntary carbon offset market. Society at large should be guarded in judging the genuineness of efforts to offset carbon emissions through such inexpensive methods for which there is some degree of scientific uncertainty. The voluntary approach to mitigating greenhouse gases and addressing climate change seems to be exacerbating the problem of global warming. By encouraging businesses to seek out inexpensive strategies, the voluntary approach is allowing businesses to claim emissions reductions from strategies that have not been wholly accepted as scientifically sound methods for addressing climate change.³² The only scientifically acknowledged method of countering climate change is through emissions reductions.³³ The voluntary approach encourages businesses to claim economically and scientifically “cheaper” strategies as valid methods for countering climate change and allows them to avoid having to make serious structural changes involving emissions reductions, indisputably reducing emissions and “offsetting” the effects of climate change.

To further clarify the structure of the voluntary carbon offset market approach and to bolster the argument that voluntary efforts are not in the public interest, I have included interviews conducted with key figures active in the carbon offset forestry industry in Brazil. With the support of the Ben Elrod Scholarship of the Carl Goodson Honors Program I received a unique opportunity to study the voluntary carbon offset forestry market in Curitiba Brazil in the summer of 2007. I conducted numerous interviews with forestry professors, lawyers, leaders of nongovernmental organizations, and other individuals active in carbon offset forestry. While a

³² Climate Vision. “Program Mission.” <http://www.climatevision.gov/mission.html> (accessed March 27, 2008).

³³ “Joint science academies” statement of G8+5 countries on climate protection and energy efficiency.” (May 2007) <http://www.pik-potsdam.de> (accessed October 20, 2007).

Brazilian case study in carbon offset forestry was not achieved, the inside information I received through these interviews on the nature of the voluntary offset approach invaluable to understanding carbon offset forestry within the private sector.

An early theory

In his 1976 article, "Can We Control Carbon Dioxide in the Atmosphere?," professor Freeman Dyson first mentioned the possibility of controlling carbon dioxide in the atmosphere through planting some type of vegetation (mentions American Sycamore and water hyacinths) should an "emergency situation" evolve. According to Dyson's argument, should an "acute ecological disaster" occur as a result of massive carbon dioxide emissions, an emergency plant-growing program" would facilitate climate control and would substitute for the more drastic solution put forward by some calling for the cessation of carbon dioxide-generating activities or, in Dyson's words, "the shutdown of industrial civilization."³⁴ In the first section of the article, "Statement of the Problem," Dyson clearly lays out estimated values of carbon content in the biosphere and estimated carbon dioxide releases into the atmosphere. Having these established figures, Dyson discusses the issue of increasing levels of carbon dioxide in the atmosphere and mentions that many studies had been conducted on this issue, which had led to various conclusions as to the results; some scientists argued the presence of global cooling and some argued the existence of global warming.³⁵ Some even argued that an increase in carbon dioxide levels could be beneficial to mankind, a position which Dyson does not dismiss in his article.³⁶

³⁴ Dyson, Freeman J. "Can We Control Carbon Dioxide in the Atmosphere?" *Energy* 2 (1977): 288.

³⁵ Weart, Spencer. "Introduction: A Hyperlinked History of Climate Change Science," American Institute of Physics (2007). <http://www.aip.org> (accessed November 1, 2007).

³⁶ Dyson, Freeman J. "Can We Control Carbon Dioxide in the Atmosphere?" *Energy* 2 (1977): 287.

In his article, Dyson mentions Stephen H. Schneider's article, "On the Carbon Dioxide—Climate Confusion," in which the author concludes that the increase in atmospheric carbon dioxide will lead to a rise in global temperatures.³⁷ Dyson states that a rise in global temperatures is "subject to great uncertainty," but he also asserts that most scientists agreed that the increased levels of carbon dioxide brought more dangers than benefits.³⁸ According to Spencer Weart, the early 1970s were marked by a rise in environmentalist concerns and an advancing of negative attitudes regarding human impact on the environment. Climate studies were being conducted, but some scientists presented models which argued that human activity through the greenhouse effect was putting smog into the world and blocking sunlight, thus contributing to global cooling.³⁹ Dyson is writing in the context of the early discovery and study of the impact of climate change due to greenhouse gases.

Dyson's also mentions that the increased levels of carbon dioxide in the atmosphere are primarily the result of the burning of fossil fuels. Providing estimated values he establishes that a large amount of carbon dioxide is being emitted into the atmosphere through the burning of fossil fuels. In explaining the various scientific interpretations of atmospheric carbon dioxide, Dyson alleges that "it is inevitable" that the human population will continue to burn fossil fuels "in spite of various dire warnings." In his conclusions, Dyson strongly emphasizes the need to develop renewable fuels as a replacement for fossil fuels.⁴⁰

In acknowledging that the scientific community had not reached a solid consensus on the issue of high levels of atmospheric carbon dioxide in 1976, Dyson's article must be understood

³⁷ Schneider, Stephen H. "On the Carbon Dioxide—Climate Confusion." *Journal of the Atmospheric Sciences* 32 (1975): 2060.

³⁸ Dyson, Freeman J. "Can We Control Carbon Dioxide in the Atmosphere?" *Energy* 2 (1977): 288.

³⁹ Weart, Spencer. "Introduction: A Hyperlinked History of Climate Change Science." *American Institute of Physics* (2007). <http://www.aip.org> (accessed November 1, 2007).

⁴⁰ *Ibid* 288-290

as a single theory proposed within this context of scientific uncertainty rather than a definite solution to a problem known and well studied by scientists. Before examining the details of Dyson's theory, what must be established is that, during the 1970s, scientists were not in accord over the meaning of a growing presence of an increased level of carbon dioxide in the atmosphere. Dyson's argument is not a response to a definite established theory of global warming but was in response to what Dyson believed were prevailing scientific opinions of the time acknowledging that no theory was universally accepted by all scientists.⁴¹

At the core of his main argument that planting plants can theoretically reduce the amount of carbon dioxide in the atmosphere is Dyson's estimation that such measures should only be pursued should an extreme scenario arise whereby dangerously high levels of carbon dioxide in the atmosphere lead to "an acute ecological disaster." He asks whether in this extreme scenario it would be possible to halt or reverse rising levels of carbon dioxide without temporarily halting the industrial sector, and his answer acknowledges this possibility. Proposed as a short-term "emergency response" to global warming, Freeman Dyson's argument is an affirmation of the feasibility of planting a large-scale tree-plantation to remove the carbon from the atmosphere in an emergency situation; in a decade of scientific disagreement regarding the effects of increased levels of carbon dioxide in the atmosphere, one scientist proposes a solution to a hypothetical emergency scenario consisting of planting large scale tree-plantations to reduce carbon dioxide levels.

Dyson's values and estimations in the article are simply to affirm the feasibility of an emergency "stopgap" project to hold carbon levels down until a permanent shift from fossil fuels occurs.⁴² Because his ideas were proposed as temporary measures should an emergency situation

⁴¹ Dyson, Freeman J. "Can We Control Carbon Dioxide in the Atmosphere?" 288.

⁴² Dyson, Freeman J. "Can We Control Carbon Dioxide in the Atmosphere?" 290.

arise, it should be understood that Dyson did not directly inspire the carbon offset industry of today. The idea of carbon offset forestry may have had its preliminary foundations in Freeman Dyson's 1977 article, but the current practice of offsetting carbon emissions as a voluntary action by industrial corporations and other businesses is more influenced by public pressure on companies to become more environmentally conscious. Dyson's idea would be studied in the 1980's but a rough construction of his theory would not be implemented for twelve years.

Beginnings of the Carbon Offset Industry

The decade of the 1980s was the warmest on record, causing more individuals to pay closer attention to the scientists who were addressing the climate changes.⁴³ The summer of 1988 and the intense drought that accompanied it seemed to have alarmed the public, causing scientists to issue reports to Congress on these changes.⁴⁴ That same year, the Intergovernmental Panel on Climate Change was created by the United Nations Environment Programme and the World Meteorological Organization. Surmounting concern over the decade's unusually high temperatures led many companies and groups to consider ideas on reduction of atmospheric carbon dioxide.

In October 1988, Applied Energy Services (AES) of Arlington, Virginia, announced it was building a fossil fueled power plant, but it also announced it would take responsibility for the emission of greenhouse gases by the plant through financing a tree plantation in Guatemala. According to a 1988 article in Science News, AES CEO Roger Sant concluded his company

⁴³ Weart, Spencer. "The Public and Climate Change (cont.—since 1980)." American Institute of Physics (2007). <http://www.aip.org> (accessed November 1, 2007).

⁴⁴ Monastersky, Richard. "Scientist says greenhouse warming is here." Science News (1988). <http://findarticles.com> (accessed November 3, 2007).

“ought to try and do something” to offset its emissions.⁴⁵ AES provided funds for the World Resources Institute and CARE International to develop a reforestation project in a developing country where deforestation was occurring.

An article in *Science Magazine* reveals the hopeful opinion held by some scientists on the value of carbon offset forestry by introducing an instrumental scientist in the debate over carbon offset forestry. Gregg Marland, a scientist named with the Oak Ridge Tennessee National Laboratory, initiated much of the early research into carbon offset forestry through research at the Institute for Energy Analysis in Oak Ridge.⁴⁶ Apart from testifying before Congress regarding trees and their value in carbon storage, and serving as a contributor to the International Panel on Climate Change (IPCC) on various publications, Marland interacted in person with Freeman Dyson during the late 1970s and early 1980s in studies concerning the storage of carbon in forests.⁴⁷ Marland is a crucial figure in gathering scientific support for carbon storage in trees and the positive scientific results of his studies during the 1980s would be used in part to justify further exploration and development of carbon offset forestry projects.

Having conducted experiments on “CO₂-relief” (carbon offset) strategies, Marland represented a strong voice of support of the carbon offsetting approach. The research Marland had conducted demonstrated that the vegetation most efficient in carbon dioxide uptake is more like agricultural crops than trees.⁴⁸ AES’s decision to act on the carbon dioxide problem “is one of the most farsighted and socially responsible decisions a private company has ever made,”

⁴⁵ Raloff, Janet. “CO₂: how will we spell relief? Concern over greenhouse warming generates innovative ‘relief’ strategies.” *Science News* (1988).). <http://findarticles.com> (accessed October 10, 2007).

⁴⁶ Krause, Carolyn. “Reversing the Trend: Researchers seek creative ways to slow the buildup of atmospheric carbon dioxide.” *Oak Ridge National Laboratory Review* (2007): 22.

⁴⁷ Ibid

⁴⁸ Ibid

according to Marland.⁴⁹ Other articles expose Marland's scientific results in greater detail.

During the latter part of the 1980s, Marland concluded that over 400 million acres of American sycamore could offset the United States' fossil fuel emissions.⁵⁰ In his findings, Marland states that increasing forest productivity through techniques such as "fertilization, irrigation, and weed, fire and pest control" can also raise a tree's yield in carbon sequestration.⁵¹

A study conducted by Norman Myers and Thomas J. Goreau further solidified the argument that carbon offset forestry can be beneficial for efforts in reducing greenhouse gases. The study concludes that large-scale tropical reforestation efforts in the tropics could serve not only to counter the greenhouse effect but also an opportunity to involve local farmers in community forestry projects. Published in 1991, this article adds to the existing positive view of carbon offset forestry as a viable option for reducing greenhouse gases in the atmosphere and contributing to agroforestry. But the study does not firmly establish that carbon offset forestry is scientifically verified to reduce greenhouse gases. In Myers' and Goreau's own words, "The merits of [carbon offset forestry] are persuasive in principle at least: it would serve to sequester substantial amounts of carbon from the global atmosphere." The authors' regard for carbon offset forestry as theoretical is a crucial example of how scientists are placing excessive hope in this theory.⁵²

Responding to a rise in interest in carbon offset activity following the Guatemala project and with other groups initiating offset projects in Ecuador and Uganda, Mark Trexler and Richard Meganck attempted to link climate change mitigation and economic development in the

⁴⁹ Raloff, Janet. "CO2: how will we spell relief? Concern over greenhouse warming generates innovative 'releaf' strategies." *Science News* (1988). . <http://findarticles.com> (accessed October 10, 2007).

⁵⁰ Kinsman, John D., and Mark C. Trexler. "Into the Wood." *Electric Perspectives* (1995). . <http://findarticles.com> (accessed November 8, 2007).

⁵¹ Rick Weiss. "Arboreal storage for carbon dioxide - atmospheric carbon dioxide may be controlled by increasing forest productivity." *Science News* (1988). . <http://findarticles.com> (accessed November 7, 2007).

⁵² Myers, Norman, and Thomas J. Goreau. "Tropical Forests and the Greenhouse Effect: A Management Response." *Climatic Change* 19 (1991): 215-226.

developing world.⁵³ The authors appear to address this emerging market hesitantly, arguing that regulatory systems for carbon offset projects will not always be compatible with a developing nation's economy. But for the most part, Trexler and Meganck encourage the private sector to become involved in carbon offset activities to produce jobs in agroforestry markets based on a lack of investment in these sectors. Trexler and Meganck believe that if properly invested, carbon offset ventures can both serve to mitigate climate change and lead to economic development. What is lacking from Trexler and Meganck are long-term case studies on carbon offset projects providing evidence of this offset market's ability to help local populations through economic development. The authors do discuss current projects in Ecuador, Guatemala and Malaysia, but because these are currently ongoing projects, the authors only discuss the nature of the projects and do not have investigations of these projects on which to base their opinions. Without allowing substantial time to pass for investigations and thorough analyses of these projects' benefits and issues to surface, the authors promote carbon offset forestry programs as sponsors of economic development based on theory and conjecture.⁵⁴

One common argument present in the Roluff, Trexler, and Myers articles is that carbon offset strategies should be pursued in conjunction with measures to increase energy efficiency and a decrease in the use of fossil fuels. All three authors mention that carbon offset forestry must be a part of a final goal to reduce carbon emissions as Freeman Dyson suggested. But not present in these pieces is the recommendation that groups carry out these projects in the midst of an "emergency" scenario or following an "ecological disaster," as Freeman Dyson made explicit in his 1976 article. These articles are part of a wider group of literature in the early 1990s which

⁵³ Lohmann, Larry. *Carbon Trading: a critical conversation on climate change, privatization, and power*. Upsala, Sweden: Corner House, 2006.

⁵⁴ Trexler, Mark C., and Richard Meganck. "Biotic carbon offset programs: sponsors or impediments to economic development." *Climate Research* 3 (1993): 129-136.

advocated that carbon offset forestry should be implemented by industry as a routine mechanism for offsetting carbon emissions. Excitement radiated from these pieces in hopes that the carbon offset forestry sector would be a major option in countering greenhouse gases.

While these articles do mention the need to pursue these strategies, their descriptions of carbon offset forestry are presented in language suggesting it is a scientifically solid method for reducing greenhouse gasses.⁵⁵ Had these scientists and journalists approached carbon offset forestry from a more judicious point of view, allowing enough time to pass and many case studies to be examined before acclaiming it as a “socially responsible” method which will ease greenhouse emissions and foster economic progress in developing countries, carbon offset forestry could have been analyzed in a more sensible manner and esteemed as a theory based on evidence and research.⁵⁶

The early 1990s was marked with various trial experiments of carbon offset forestry with various investors sponsoring projects in Guatemala, Ecuador, and Uganda. The United Nations began investigating climate change policy, including the potential of carbon offset forestry. In 1992, at the Rio Earth Summit, 191 nations (including the United States) signed the United Nations Framework Convention on Climate Change (UNFCCC).⁵⁷ The UNFCCC acknowledges that industrial and other carbon dioxide emissions are negatively impacting climate change and within the UNFCCC’s terms, it sets up a general structure for intergovernmental efforts to combat climate change. Governments are poised to gather information on their country’s carbon dioxide emissions and launch national strategies for countering greenhouse gas emissions. Nearly all nations signed the UNFCCC. Article IV of the UNFCCC states that all parties should

⁵⁵ Raloff, Janet. “CO2: how will we spell relief? Concern over greenhouse warming generates innovative ‘relief’ strategies.” *Science News* (1988).). <http://findarticles.com> (accessed October 10, 2007).

⁵⁶ Trexler, Mark C., and Richard Meganck. “Biotic carbon offset programs: sponsors or impediments to economic development.” *Climate Research* 3 (1993): 136.

⁵⁷ “United Nations Framework Convention on Climate Change.” <http://unfccc.int/> (1992): 23.

publish an inventory of available carbon sinks and promote the sustainable management of biomass and forest sinks thus encouraging member nations to pursue carbon offsetting strategies.⁵⁸

Under the UNFCCC came the 1997 Kyoto Protocol treaty, a legally binding agreement to reduce greenhouse gases was signed and ratified by most of the UNFCCC member nations except by Australia and the United States. Member countries with the highest emissions must implement emissions restrictions but have the option of participating in clean development mechanisms (CDMs) consisting of investing money for emissions reductions projects in developing countries to offset domestic emissions. Carbon sinks through afforestation and reforestation as carbon offset projects were included as CDMs and countries with high emissions were permitted to trade carbon credits with developing nations. The market of emissions trading that emerged, whereby companies in UNFCCC member nations were permitted to buy carbon credits from developing nations, is labeled “cap and trade.” Governments set a “cap” on the level of carbon emissions allowed by a business based on size and income. Businesses must “trade” or purchase carbon credits which counterbalance their emissions.⁵⁹

Voluntary vs. Legally-binding Efforts

Most governments in the developed world have pursued either policies encouraging voluntary reduction of greenhouse gases on the part of industry and individual citizens, and state-led efforts enforcing “caps” on greenhouse emissions. The United States has pursued a voluntary

⁵⁸ “United Nations Framework Convention on Climate Change.” (1992) <http://unfccc.int/resource/docs/convkp/conveng.pdf> (accessed November 7, 2007)

⁵⁹ “Kyoto Protocol,” (UNFCCC), http://unfccc.int/kyoto_protocol/items/2830.php (accessed November, 7 2007); Rudell, Steven, Michael Walsh, and Murali Kanakasabai. “Forest Carbon Trading and Marketing in the United States.” Paper commissioned by the North Carolina Division of the Society of American Foresters (SAF) and funded through the SAF’s Foresters’ Fund. October 2006.

market of reporting and controlling greenhouse gas emissions expressing its policy by not signing the legally-binding agreement to cap greenhouse emissions, the Kyoto Protocol. US companies have participated in voluntary reporting of greenhouse gasses and voluntary pursuance of carbon offsets. Under the Energy Policy Act of 1992, a voluntary reporting system was created to report greenhouse emissions and reductions. Companies carry out carbon offset forestry activities without government obligation, encouraging other groups to participate in carbon offset activities.⁶⁰ Companies would participate in carbon forestry activities seeking to “enhance their brand identity” as a type of promotion of an environmental image.⁶¹ The result of abstention from signing the treaty is that a large voluntary carbon offset market has emerged in the United States with companies purchasing carbon offsets through independent groups or firms. The voluntary carbon market in the United States was estimated to be worth \$91 million in 2006.⁶²

Much of my understanding of the two approaches undertaken by developed countries to combat climate change, those approaches being the 1997 Kyoto legally-binding agreement and the United States “voluntary market,” happened through a series of interviews I conducted in with university professors, environmental attorneys, and grassroots activists in Curitiba Brazil in the summer of 2007. In the first stages of research for my Honors Project and in reading more about carbon offset forestry, I discovered that many of these projects had been undertaken in developing countries. I found one carbon offset forestry project being undertaken in the state of Paraná Brazil by a non-profit environmental organization called SPVS (Sociedade de Pesquisa

⁶⁰ U.S. Department of Energy. “Executive Summary: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005.” <http://www.epa.gov/climatechange/emissions/usinventoryreport.html> (accessed November 9, 2007).

⁶¹ Velasquez-Manoff, Moises. “Do Carbon Offsets Live Up to their Promise?” *The Christian Science Monitor* (2007).

⁶² Hamilton, Katherine, Ricardo Bayon, Guy Turner, and Douglas Higgins. *State of the Voluntary Carbon Markets 2007: Picking Up Steam*. Ecosystem Marketplace (2007): 4.

em Vida Selvagem e Educação Ambiental, or the Society for Wildlife Research and Environmental Education). The project was financed by American Electric Power, Chevron and General Motors. I traveled to Curitiba Brazil for one month in the summer of 2007 to gain firsthand reports of carbon offset forestry in Brazil. It was my intention to interview SPVS in depth to promote their carbon sequestration project, but I was never successful at obtaining a personal interview with a representative of SPVS.⁶³

One of the first forestry experts I spoke with was a professor of forestry engineering at the Federal University of Paraná and also held a degree in law. His expertise helped me understand why tropical climates had been pursued by many companies in search of carbon credits. According to this professor, groups had always been attracted to tropical markets because of many of the natural qualities of tropical forests. Because tropical zones do not experience dramatic shifts in temperature and maintain a constant climate, vegetation in tropical zones including trees does not experience defoliation. Trees and vegetation in temperate regions have cold winters and because they lose their foliage their carbon intake is less during cold months. The professor pointed out that groups seeking carbon storage are most interested in tropical regions because these areas allow trees to stay green throughout all seasons maximizing carbon intake and sequestration. The professor also brought to my attention that certain types of pine and eucalyptus trees were the most common varieties sought in carbon sequestration projects in the state of Paraná for their rapid growth.⁶⁴

The most prevalent opinion of the experts I interviewed in Brazil seemed to be support and commendation of the United States and the “voluntary approach” sought by countries which

⁶³ Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental. “Projetos de Ação Contra o Aquecimento Global.” (2007) http://www.spvs.org.br/projetos/sdc_index.php.

⁶⁴ Professor of forestry, Federal University of Paraná, interview by Jason Smith, Curitiba, Brazil, July, 2007.

refused to sign the Kyoto treaty. One Brazilian environmental activist helped me better understand the voluntary offset market and its perception by most Brazilian entrepreneurs. The individual I spoke with was active in a grassroots forestry conservation organization in rural Paraná and in July 2007 was in the process of obtaining her Master's in Forestry Engineering at the Federal University of Paraná. She contends that the United States government was clever in not signing Kyoto as it allowed businesses to take action to decrease their carbon emissions as an act of personal responsibility, and if a company shows intense dedication to reducing their carbon emissions they would be able to use their environmental image as positive marketing and a "greener" business image. The United States' approach in delegating responsibility to the individual consciences of business leaders opened up the opportunity for businesses to choose how to offset their emissions and allowing them the opportunity to reduce emissions beyond necessary government restrictions as is the case in Western Europe.⁶⁵

The individual I spoke with also discussed how many businesses view carbon offset forestry projects as "long-term investments." The primary market through which some companies are linked with a broad variety of carbon sequestration projects (including carbon offset forestry) is through the Chicago Climate Exchange (CCX). CCX is the primary location for activity in the voluntary market, where groups buy and sell carbon offsets through different types of projects meant to be long-term investments in offsetting a company's carbon emissions. The voluntary market contrasts with those countries engaged in the "cap and trade" system in that there is no government regulation of the carbon emissions trading both in implementation of a carbon offset project and in the financial aspects of buying and selling carbon. As she explained, the voluntary market allows prices for carbon offsets to be much more inexpensive as

⁶⁵ Environmental activist and Graduate Student at Federal University of Paraná, interview by Jason Smith, Curitiba, Brazil, July, 2007.

compared to prices of carbon credits under Kyoto. Also, she explained that there is more flexibility in the voluntary market: while projects traded on the CCX do not need certification or revision, all Kyoto projects have to be independently evaluated by the CDM Executive Board.⁶⁶

To better understand the complexities of the Kyoto Protocol I spoke to a consultant with ViaEx, a consulting firm in Curitiba which works under the larger Carbon Management Consulting, an international consulting firm based in Hong Kong. He explained the complexities of the Kyoto Protocol and the reasons the United States did not sign the legally-binding agreement. According to the consultant I spoke with, carbon credits through forestry offset projects had not been approved by the CDM Executive Board and could not be pursued as CDMs by Kyoto member states. His work was with companies that wished to offset their activities through companies investing in the development of wind-powered energy plants to gain carbon credits, or investment in renewable energy projects. A CDM for a carbon offset projects had not yet been approved by the Executive Board because of the verifiability of such a project. The consultant explained that the Kyoto Board had not accepted proposals for forestry projects for reasons related to the verifiability of such a project and whether the group employed to reforest a parcel of land was doing what it was hired to do. Other issues have been debated by Kyoto members regarding how to factor in alterations in the natural cycle, whether forest fires or erosion, and have been described as unreliable in terms of their carbon storage.⁶⁷

I spoke to the president and vice-president of *Ideia Ambiental*, an organization that offers primarily domestic businesses and nongovernmental organizations carbon neutralization strategies through carbon credits or carbon offset options. This company also offers project verification and monitoring to ensure that a project is accomplishing what it intended to

⁶⁶ Ibid

⁶⁷ Consultant, ViaEx, Carbon Management Consulting, interview by Jason Smith, Curitiba, Brazil, July, 2007.

accomplish. The group's president mentioned how many investors through the voluntary market in the United States are looking to become "carbon neutral" and many of the projects overseen by *Ideia Ambiental* included forestry projects. The Ministry of Science and Technology in Brazil was responsible for approving projects involving carbon credits and carbon offsets. He explained to me how verifying a project with the Brazilian Ministry of Science and Technology can be complex and that their organization researched proposed projects and projects already in existence to verify that the project method was being executed properly.⁶⁸

I also spoke to a professor of environmental studies at the Federal University of Paraná who is on the environmental board that specializes in approving carbon credit projects and carbon offset projects of the Brazilian Ministry of Science and Technology. He explained to me how many the Brazilian government approves of all of the projects but monitoring to see if the projects are actually being realized does not occur. He mentioned the likelihood that some companies from the abroad could come to Brazil and purchase a parcel of forest and claim it as a carbon credit. He said that he had spoken to executives at SPVS and they had been given the money to develop a carbon offset forestry project in Brazil by several U.S. corporations but did not follow through with planting a forest. These allegations could not be verified because a regulatory body did not exist in Brazil to verify the existence of such projects and prosecute should physical evidence of fraud surface. These suspicions demonstrate the prospect for corrupt practices being implemented as benefits exist for those on both sides of the corruption. Companies can pay for projects that are positive public relations for the company as a forestry project to sequester carbon emissions, regardless of the actual impact on climate change. With the absence of a government body serving to verify that the offset projects are being implemented, the organizations overseeing the projects are paid to plant a forest whether one is

⁶⁸ President, *Ideia Ambiental*, interview by Jason Smith, Curitiba, Brazil, July, 2007.

planted or not. Without the government infrastructure to ensure such projects are implemented, the possibility for corruption in developing countries is high.⁶⁹

Most of the individuals I spoke to spoke highly of the concept of responsibility delegated to the individual in environmental matters for capitalistic motives rather than imposing restrictions, whether local or international regulations, on carbon emissions. It was evident that many in Brazil feel the same way about personal responsibility to the environment and that one's own individual conscience should guide actions. I spoke with a student at the Catholic University of Paraná at his place of work, the Museum of the Atlantic Forest in Curitiba, about an individual carbon offset project he was working on. Developing the project on his own, this student was in the process of purchasing a plot of land to plant eucalyptus trees on. He was executing his entire project as an individual without outside funding to make an impact on climate change. The logistics of purchasing land and having his project accepted by the Ministry of Science and Technology were long-term: his expectation was that it would take over four years for his project to be approved, before he could begin planting any of his trees.⁷⁰

Brazilian capitalistic spirit makes for an environment susceptible to fraud and some corruption in the execution of carbon offset projects. While most people I spoke to seemed to exhibit a sense of personal or individual responsibility for care of the environment, lack of government oversight over corporate projects seems to create an environment vulnerable to fraud in the system. While the Kyoto protocol has mechanisms to ensure projects are being implemented, the voluntary market does not possess the infrastructure necessary to ensure and verify the fulfillment of carbon offset projects.

⁶⁹ Professor of Environmental Studies at the Federal University of Paraná, interview by Jason Smith, Curitiba, Brazil, July, 2007.

⁷⁰ Environmental Activist and student at the Pontifical Catholic University of Paraná, interview by Jason Smith, Curitiba, Brazil, June, 2007.

Early Criticism of the Carbon Offset Forestry Model

Throughout the 1990's, critics emerged to dispute the carbon offset forestry model in practice. One of the first critics to scrutinize carbon offset forestry in a methodical approach is Larry Lohmann in his article "The Dyson Effect: Carbon 'Offset' Forestry and the Privatisation of the Atmosphere." While going through various arguments against carbon offset forestry Lohmann briefly mentions the UtiliTree project as an example of corporations attaching positive labels to carbon offset projects.⁷¹ Published by 'The Corner House,' a non-governmental organization base in the UK that leads "democratic and community movements for environmental and social justice,"⁷² Lohmann's article exhibits a vehement passion against carbon offset forestry, describing carbon offsets as simply "license[s] to pollute" and citing the inherent inequality that derives from northern countries' management of the southern developing world's land and resources. As one of the first clear critical analyses of the carbon offset forestry movement, Lohmann's piece articulates a broad range of flaws in the carbon offset forestry design.⁷³ Though in the first paragraphs of his piece he indicates frustration with Freeman Dyson's proposal, Lohmann focuses his article primarily on issues associated with expansion of the industry since the first project was implemented by AES in 1988.

In his article, Lohmann first presents the scale at which carbon offset forestry projects have grown. At the time Lohmann was formulating his argument in 1999, four million hectares of carbon sink plantations existed globally. He cites Mark Trexler as predicting world carbon offset forestry would rise to \$40 to \$100 billion annually by 2020, and he cites the World Bank as

⁷¹ Lohmann, Larry. 1999. "The Dyson Effect: Carbon 'Offset' Forestry and the Privatisation of the Atmosphere." The Corner House, Briefing 15. <http://www.thecornerhouse.org.uk> (accessed September 12, 2007).

⁷² The Corner House. "Who we are, what we do, and why we do it." <http://www.thecornerhouse.org.uk/about>. (accessed October 20, 2007).

⁷³ Ibid

predicting a swell of \$150 billion by the same year. Lohmann establishes that the carbon offset market is an active presence for companies to seek business.⁷⁴

Lohmann's key argument against carbon offset forestry is its fault in operation by capitalist principles of efficiency in allocation and in production. According to Lohmann, efficiency in allocation causes companies to place projects in areas where land is cheapest, causing companies to impose forestry schemes to offset their emissions on rural poor communities. Efficiency in production in the case of carbon offset forestry implies that most plantations will be monocultures or cultivated areas consisting of single species of vegetation, Lohmann refers to studies that show monocultures to be damaging to environments and societies.⁷⁵ Lohmann thoroughly criticizes various industry issues related to the carbon offset forestry market. Some of these criticisms include the difficulties in defining property rights and economic definitions for trading carbon as an intangible commodity, the lack of a generally accepted certification system for authenticating carbon offset forestry projects and monitoring their development, and the reality that numerous groups advocating for the expansion of this strategy exist to benefit from planting trees to reduce carbon dioxide emissions.⁷⁶

Lohmann includes discussion on the emergence of broad societal issues associated with carbon offset forestry. One such issue is the evolvment of a faulty mindset which rationalizes one's carbon dioxide emissions provided that one pays for the planting of trees to retract or offset one's pollution. Lohmann says individuals will not reduce emissions or encourage energy efficiency if one can choose to absolve offsets through tree planting. The author makes clear that the only possible way to stop global warming is through reduction of greenhouse gas emissions. Individuals who purport the argument that their emissions will be absorbed by the trees they

⁷⁴ Ibid

⁷⁵ Ibid

⁷⁶ Ibid

plant through financial procurement only continue the trend of uncontrolled greenhouse emissions and may perhaps lead to greater emissions.

Lohmann also raises the issue of the confusion between carbon offsetting and reforestation efforts. Lohmann argues that another reason carbon offset forestry model is being put forward is because of the “commonsense” view that it is helpful to plant trees in any scenario.⁷⁷ Responding to an International Panel on Climate Change (IPCC) report on carbon storage, many environmental groups engaged in reforestation work in tropical areas expressed concern over the issue of carbon offset forestry. In June of 2000 several environmental NGOs, including WWF, Friends of the Earth and Greenpeace, expressed concern with the rise carbon offset forestry as an industry for the industry’s reducing forests as an instrument for carbon storage.⁷⁸ Lohmann’s argument seems to harmonize with many existing environmental NGOs’ sentiments at the time regarding the carbon offset industry. Lohmann makes clear that the practice should not be confused with reforestation as being conducted for the altruistic purposes of countering the depletion of the world’s forests.⁷⁹

Also discussed in great detail by Lohmann is the emergence of a form of “carbon imperialism” or a form of neocolonialism. Using labels such as “Northern countries” for the more developed nations and “Southern countries” for the less developed nations, Lohmann contends that the more developed nations have placed offset forestry projects in developing nations to save on costs and that this practice is degrading and shameful. “Responsibility for corporate decisions and state coercion of the rural poor is diffused across the affluent sections of

⁷⁷ Ibid

⁷⁸ Ozinga, Saskia and Jutta Kill. “Carbon sinks emerge as hot potato.” EU Forest Watch, Issue 44 (2000).

⁷⁹ Lohmann, Larry. The Dyson Effect.

society, who are isolated from those who will take the brunt of carbon ‘sequestration.’” Poor farmers and laborers are the ones who plant trees to offset the pollution of wealthy nations.⁸⁰

Several years after he published his 1999 article, Lohmann specifically attacked the AES carbon offset project in Guatemala as an example of the employment of his neocolonial model in his book, *Carbon Trading: a critical conversation on climate change, privatization, and power*. Though written years after his article, his book elaborates more on the 1988 Guatemala project. One of his points of contention with the project is that a 1999 external evaluation of the Guatemala project revealed that it did not work to sequester the one million tons of carbon that it had guaranteed to offset.⁸¹ Lohmann also claimed that the project was mismanaged by CARE, the NGO that pledged to administer the project, due to inability to direct local villagers in the reforestation process and in carbon accounting. Lohmann reported that CARE administration underestimated the difficulty of the tasks, which included accounting for the carbon sequestered, requiring specialized procedures involving examination of growth rates, soil changes, and study of community interaction. Lohmann’s distrust of carbon offset forestry is exemplified in his critique of the AES offset project in Guatemala.

But Lohmann’s piece should be understood within its context as well. Throughout “The Dyson Effect,” Lohmann emanates a sensationalized tone. He suggests that the offset trend will lead to a “carbon imperialism” whereby developed nations “conceal and extend” inequalities in developing nations on issues such as land distribution and forest rights. While proponents of carbon offset forestry were misguided in scientific perspective and hasty in judging it a reliable method for curbing the greenhouse effect, it cannot be solidly established that companies sought to formulate a malicious system to exploit developing nations. Perhaps Lohmann is correct in

⁸⁰ Ibid

⁸¹ Lohmann, Larry. *Carbon Trading: a critical conversation on climate change, privatization, and power*. Upsala, Sweden: Corner House, 2006.

arguing that efficiency standards drove companies to cheaper locations, but his primary argument that corporations' carbon offset forestry projects were destructive to "equity and democratic politics" which led to "carbon imperialism" is somewhat of an exaggeration.⁸²

Lohmann's piece is significant in being one of the first to elucidate problems with the model of carbon offset forestry. Larry Lohmann advanced his perspective through various articles and publications and has contributed significantly to formulating a comprehensive and detailed argument against economic, social, and ecological impacts of planting trees to sequester carbon dioxide. Though Lohmann's arguments in "The Dyson Effect" arrived years after carbon offset forestry had gained momentum as an established industry, his primary thesis addresses theoretical elements of carbon offset forestry that could have been properly studied preventing it from becoming "received wisdom." Critical of Freeman Dyson's theories and critical of the disregard for further investigation into the theory in practice, Lohmann is significant in instigating thorough debate on the realities of carbon offset forestry in practice.

While in Brazil, I was able to gain a serious understanding of both the voluntary market and the Kyoto Protocol. In order to understand more about how companies execute carbon offset forestry projects and account for them, I sought to study a group that had developed a forestry project through the voluntary market. I found one such offset project that was being carried out in Arkansas called PowerTree.

PowerTree: Background

As scientific evidence of climate change began to increase throughout the early 1990's the United States government began to explore the possibility of encouraging businesses and industry to pursue voluntary efforts to reduce greenhouse gases. One industry that accounted for

⁸² Lohmann, Larry. The Dyson Effect.

a large portion of greenhouse gas emissions was the electric utility industry. According to the Energy Information Administration, coal and gas emissions due to energy production accounted for 57 % of the total carbon dioxide emissions in 1992. Previous years had seen similar trends in emissions. Because the electric utility sector produced large amounts of carbon dioxide the United States Government placed heavy pressure on utility groups encouraging them to seek voluntary actions to manage carbon dioxide emissions.⁸³

In 1992 the Energy Policy Act section 1605(b) called for the creation of a voluntary carbon database to encourage action by business leaders, detached from government enforcement or regulation. This database would be a public record of greenhouse gas emissions in order to monitor and assess emissions particularly by the electric utility industry. With growing concern over the relation of carbon emissions by the electric utility industry to climate change, the Clinton administration encouraged electric utilities to take deliberate steps to reduce emissions or compensate for the emissions already being produced. In 1994, the Edison Electric Institute suggested the creation of the predecessor to PowerTree, the UtiliTree Carbon Company to invest \$2.5 million in forestry projects in Arkansas, Louisiana, Oregon, and Mississippi, and also sites outside the U.S. in Malaysia and Belize. UtiliTree would be a non-profit company consisting of 40 forestry projects, including reforestation, preservation, and reduced impact logging, with the intention of capturing 1.6 million tons of carbon dioxide at less than \$2 per ton. UtiliTree participant companies would also share the carbon offsets created through these projects and report them to the voluntary Energy Policy Act section 1605(b) database.⁸⁴

⁸³ Energy Information Administration. "Historical Data series: Energy-Related Carbon Dioxide Emissions by Fuel Type, 1949-2006." <http://www.eia.doe.gov/environment.html> (accessed March 26, 2008); Anonymous Representative of PowerTree #6, interview by Jason Smith, February, 2008.

⁸⁴ Kinsman, John. "PowerTree Carbon Company: Climate Vision Workshop, February 14, 2006." http://www.climatevision.gov/pdfs/CV_Presentation.pdf (2006); Anonymous Representative of PowerTree #7, interview by Jason Smith, February, 2008; Cleco. "Utilitree Carbon Company." (2008) <http://www.cleco.com/site317.php>.

UtiliTree was one of the first projects of its kind sought by the electric utility sector. As described in a 2000 report of greenhouse gas emissions by the Energy Information Administration, UtiliTree is a “carbon-sequestration mutual fund in which electric utilities purchase shares.”⁸⁵ The UtiliTree project was described as a “portfolio” of carbon sequestration projects specifically in the forestry sector with a goal of being a “low-cost” option for managing greenhouse gases.⁸⁶ The utility industry responded positively to the UtiliTree carbon offset project for its cost-effectiveness and the ease associated with the execution of these types of projects.

The electric utility sector responded positively to the projects developed by UtiliTree and sought out further carbon offsetting opportunities. In 2002, President Bush outlined his Climate Vision plan, which had the goal of encouraging members of the energy sector to help reduce U.S. greenhouse gas emissions intensity over the course of ten years. A central part of the Climate Vision plan was achieving emissions reductions without burdening corporations and utilities with restrictions and emissions limits. As an alternative approach to climate change mitigation unlike the Kyoto Protocol, Climate Vision is based upon “encouraging” the industry sector to take voluntary actions to counter climate change. The program’s central objective is to reduce greenhouse gas emissions “without sacrificing economic growth” through “cost-effective” actions.⁸⁷

The PowerTree Carbon Company was organized in 2003 as a for-profit limited liability company to facilitate the conception of carbon reduction credits. The company was formed to

⁸⁵ Department of Energy and Environmental Protection Agency. “Carbon Dioxide Emissions from the Generation of Electric Power in the United States.” (2000): 12.

⁸⁶ Whitman, Austin F. “Forests, Credits, and Uncertainty.” Connecticut Forest and Park Association (2007): 27.

⁸⁷ Climate Vision. “Program Mission.” <http://www.climatevision.gov/mission.html> (accessed March 27, 2008).

implement carbon offset projects in a manner similar to UtiliTree. Edison Electric Institute was central in the formation of PowerTree, according to member company representatives.⁸⁸ A limited liability company registered in Louisiana, PowerTree would develop six carbon offset projects exclusively in Arkansas and Louisiana and would plant 3,609 acres of bottomland hardwood forest. Bottomland hardwood forest species included sweet gum, bald cypress, tupelo, green ash and various oak species. These projects were projected to sequester 1.6 million tons of carbon dioxide over a one hundred year period.⁸⁹ Twenty-five electric utility companies, thirteen of which are among the Forbes “World’s 2000 Largest Public Companies” list and three of which are on the Forbes “400 Best Big Companies” including Exelon, Dominion Resources, and First Energy contributed \$3,000,000 for the development of the six projects.⁹⁰

Winrock International has been appointed to conduct monitoring and quantification procedures of the six projects to assure the sequestration activity is occurring. A team from Winrock will measure the above-ground, below-ground, and soil carbon accumulations in years one, and subsequently present reports of species survival in years one and three, and advanced carbon quantification and measurement techniques will be applied five and ten years after tree planting occurs.⁹¹

A primary focus for the PowerTree Carbon Company is developing “prospective carbon credits.”⁹² In PowerTree documents describing each individual carbon offset project, it is

⁸⁸ Anonymous Representative of PowerTree #4, interview by Jason Smith, February, 2008; Anonymous Representative of PowerTree #7, interview by Jason Smith, February, 2008

⁸⁹ PowerTree Carbon Company. “Projects.” <http://www.powertreecarboncompany.com/projects.htm> (accessed March 26, 2008); PowerTree Carbon Company LLC (April 19, 2004). “Power Companies Team Up with Public, Private and Nonprofit Organizations to Manage Greenhouse Gases, Restore Critical Habitat” (PDF). Press release.

⁹⁰ DeCarlo, Scott, ed. 2007. *The World’s 2000 Largest Private Companies*. Forbes Magazine. <http://www.forbes.com> (accessed March 17 2008); DeCarlo, Scott. *The 400 Best Big Companies*. Forbes Magazine.

⁹¹ PowerTree Carbon Company LLC. “Electric Power Companies, Tree Planting, and PowerTree Carbon Company, LLC.” <http://www.powertreecarboncompany.com/ProjectSummary.pdf> (accessed March 26, 2008).

⁹² Ibid

explicitly stated that the PowerTree Carbon Company will “retain the rights to all emission reductions” acquired through the various projects. The rights to these offsets or “emissions reductions” as described in the records are allocated to the twenty-five member companies based on each company’s investment.⁹³ In an October 2003 meeting of the Power Plant Research Advisory Committee, Verne Shortell of PEPCO Holdings Inc. (PHI) described PowerTree’s intention to “bank” all of the carbon credits garnered through the individual sequestration projects.⁹⁴ These credits seem to be described as types of assets or investments. Members may report their emissions reductions to greenhouse regulatory program or greenhouse gas reporting program and also reserve the right to “transfer or assign” the carbon reductions acquired to other persons.⁹⁵

Part of PowerTree Carbon Company’s plan is to guarantee that some of the land acquired will eventually be added to the public trust and remain in public ownership. Because the projects are projected to last one hundred years, a one hundred-year carbon lease agreement has been recorded guaranteeing the investors’ legal rights to sequestration of the land for the duration of the lease should any land be sold or experience transfer of ownership.⁹⁶ Releases by the SEC explain that members will receive tax benefits through the land donation transactions carried out.⁹⁷

⁹³ PowerTree Carbon Company. “Project description: White River Offset Project.”

<http://www.powertreecarboncompany.com/> (accessed March 27, 2008); United States Securities and Exchange Commission. “Order Authorizing Acquisition in Nonutility Business.” Release No. 35-27756; 70-10138.

<http://www.sec.gov/divisions/investment/opur/filing/35-27754.htm> (accessed March 26, 2008).

⁹⁴ Power Plant Research Advisory Committee. “Meeting Minutes: 21 October 2003.” esm.versar.com/pprp/PPRAC/minutes_Oct_21_03.doc (accessed March 27, 2008).

⁹⁵ United States Securities and Exchange Commission. “Order Authorizing Acquisition in Nonutility Business.” Release No. 35-27756; 70-10138.

⁹⁶ PowerTree Carbon Company. “Project Description: Bayou Bartholomew Carbon Offset Project.” <http://www.powertreecarboncompany.com/projects/BayouBartholomew.pdf> (accessed March 27, 2008).

⁹⁷ United States Securities and Exchange Commission. Release No. 35-27756; 70-10138.

PowerTree Carbon Company stresses in its project descriptions the importance of the “ancillary benefits” attained in the development and presence of its carbon offset projects. The planting of 3,609 acres of trees has additional environmental benefits beyond the carbon sequestered including restoring trees that had been depleted in the Lower Mississippi Alluvial Valley (LMAV). One benefit that is asserted is the planting of trees on marginal agricultural lands. PowerTree documents state that the LMAV once contained 22 million acres of bottomland hardwood forest but now contains 4 million acres due to controlled flood measures and conversion of much of the land into agricultural zones.⁹⁸ Other environmental benefits stated explicitly on the PowerTree website include enhancing the LMAV biodiversity and habitat for certain species of wildlife and birds, reduced erosion and soil compaction, better water quality for the region, and reduced flooding.⁹⁹ ¹⁰⁰ With strong emphasis on the ancillary benefits mentioned recurrently in PowerTree’s main web page, and including the ancillary benefits in the list of the motives for the execution of the carbon offset projects, it is clear the company wishes to illuminate its commitment to restoring part of the original bottomland hardwood forest in the LMAV.¹⁰¹ ¹⁰²

PowerTree: Results

In the spring of 2008 I interviewed eight individual representatives of PowerTree. Each individual interviewed is associated with a separate PowerTree member company and their responses provide a unique perspective of carbon offset forestry from the viewpoint of utility

⁹⁸ PowerTree Carbon Company. “Project Description: Bayou Bartholomew Carbon Offset Project.”

⁹⁹ PowerTree Carbon Company LLC. “Electric Power Companies, Tree Planting, and PowerTree Carbon Company, LLC.”

¹⁰⁰ PowerTree Carbon Company. <http://www.powertreecarboncompany.com/> (accessed March 27, 2008).

¹⁰¹ Ibid

¹⁰² Ibid

industry representatives and their opinion of the PowerTree Carbon Company. Some were interviewed by responding to questions over email and some were interviewed over the telephone, according to the individual's schedule. Their names and respective companies remain anonymous in this study and are carefully withheld to protect against damages to reputation and professional standing. Each participant in the study was informed of the intent to use their responses to my questions in this study. Though anonymously referenced, the responses of the PowerTree representatives present an accurate industry perspective of the voluntary carbon offset approach.

I conclude that the voluntary market approach is encouraging the placement of economic prosperity above environmental sustainability. Within the framework of the voluntary approach, businesses will seek out the cheapest strategies to counter global warming. As I have discussed earlier, the scientific reliability of carbon offset forestry in countering climate change remains in question.¹⁰³ Furthermore, businesses profit from the publicity earned by engaging in such forestry projects and in investing in offsets which could in the future be sold as carbon credits. The approach undertaken by PowerTree and through many other carbon offset forestry projects could actually exacerbate the problem of climate change.

Counterbalancing carbon emissions is the primary objective of the PowerTree carbon offset forestry projects, and PowerTree acts as a limited liability company to reach this objective. The twenty-five member companies which invested in developing PowerTree projects own shares of the company and the benefits of the carbon offsetting rights are distributed based on individual financial commitment.¹⁰⁴ The purpose of PowerTree is to create carbon credits for the twenty-five members to claim as offsets of their emissions and to exist as general company

¹⁰³ Lohmann, Larry. 1999. "The Dyson Effect: Carbon 'Offset' Forestry and the Privatisation of the Atmosphere." The Corner House, Briefing 15. <http://www.thecornerhouse.org.uk> (accessed September 12, 2007).

¹⁰⁴ United States Securities and Exchange Commission. Release No. 35-27756; 70-10138.

assets. The inherent problem with PowerTree being a business is that it exists as a venture for the purpose of maximizing profit for its shareholders and not as an environmental project with the objective of assisting in the fight against global warming. Profit is placed above the interests of environmental sustainability in such a market.

One respondent mentioned that they were “a true capitalist at heart” and believed that the voluntary market approach of self-regulation was the best in addressing the problem of climate change. They pointed out that the value of one ton of carbon produced individually through the PowerTree forestry projects is substantially cheaper than the value of one ton of carbon sequestered in a forestry project that could be traded at the CCX.¹⁰⁵ These offset projects pursued independently reduce expenses even more than projects purchased through the CCX. The pursuit of individual projects thus removes the need for an intermediary firm for locating projects and reduces the overall cost of the ton of carbon. Carbon sequestered in one of the various PowerTree projects is valued at less than \$2 per ton.¹⁰⁶

Another economic benefit of the PowerTree project is publicity for being a “green” company or utility. As I learned in Brazil, one of the reasons companies embark on these projects is for the marketing benefits that come with project development. The utilities which are investors in PowerTree can use the tree-planting and carbon sequestration to appeal to customers and suggest their companies’ low environmental impact. In recent years companies have profited from presenting their company as “environmentally friendly” as many consumers have intentionally sought out groups that promote their industry as “environmentally friendly.”¹⁰⁷

¹⁰⁵ Anonymous Representative of PowerTree #6, interview by Jason Smith, February, 2008.

¹⁰⁶ PowerTree Carbon Company LLC. “Electric Power Companies, Tree Planting, and PowerTree Carbon Company, LLC.”

¹⁰⁷ Environmental activist and Graduate Student at Federal University of Paraná, interview by Jason Smith, Curitiba, Brazil, July, 2007.

According to the same respondent, the companies that invested in PowerTree did so also to keep electricity prices low for consumers. Businesses will maximize profit by choosing the most inexpensive technologies, as to not disrupt the course of earning revenue. While the carbon offset forestry projects developed under the PowerTree Carbon Company were inexpensive and kept prices relatively low for consumers, utilities were implementing strategies which could not be sufficiently supported by science and were not focusing their full attention on efforts to cut carbon emissions.¹⁰⁸

The issue of the scientific validity of carbon offset forestry was the topic of one of the questions asked of the PowerTree representatives. This question in particular generated energetic answers from all of the respondents. I asked the respondents their personal opinion on whether carbon offset forestry was a valid method for sequestering carbon and countering climate change. One of the respondents replied that they would “find it hard to imagine” arguments conceived against the PowerTree offset forestry projects and was “unfamiliar” with the controversy of carbon offset forestry being met with opposition in certain scientific fields. Another interviewee wrote “The benefits to the environment and wildlife are numerous and undisputable. And I don’t think anyone can dispute the fact that trees do remove CO₂ from the atmosphere.”¹⁰⁹ Representative #7 mentioned that the carbon storage benefits of planting an acre of forest as compared to an acre of soybeans are obvious.¹¹⁰

Other respondents mentioned that while the scientific community had yet to determine the actual value of carbon offset forestry and that the “jury is still out,” carbon offset forestry should be included as one of many strategies used to combat climate change.¹¹¹ In responding to

¹⁰⁸ Anonymous Representative of PowerTree #6, interview by Jason Smith, February, 2008.

¹⁰⁹ Anonymous Representative of PowerTree #1, interview by Jason Smith, February, 2008.

¹¹⁰ Anonymous Representative of PowerTree #7, interview by Jason Smith, February, 2008.

¹¹¹ Anonymous Representative of PowerTree #5, interview by Jason Smith, February, 2008.

the question regarding numerous scientific studies which refute the notion of carbon offset forestry being a sound model, five of the respondents identified carbon offset forestry as one of many “tools” used in addressing global warming.¹¹² The responses of the representatives of the utility companies seem to describe the PowerTree projects as opportunities to demonstrate the effectiveness and scientific certainty of carbon offset forestry as a reliable strategy. “Of note is that Utilitree and PowerTree are voluntary efforts to demonstrate carbon offset forestry viability,” said Respondent #5.¹¹³ PowerTree is described as an exercise in determining carbon offset forestry viability. PowerTree was intended to prove to science the viability of these offset projects, and all but one respondent did not cite a scientific study or evidence that carbon offset forestry was an accurate strategy.¹¹⁴

The only scientific evidence given to me by any of the respondents was by Representative #7, who cited a Duke University study on carbon storage in trees. I researched the study they mentioned and found that the study is being conducted at Duke and is called the Free Air Carbon Enrichment (FACE). This study has been active since 1997 in planting trees and measuring the reliability of the carbon storage in the tree mass. In an August, 2007, release of study findings, scientists working on the FACE project noticed that trees receiving extra amounts of carbon dioxide stored the carbon unevenly and unreliably in their projects. The study indicated that extra carbon dioxide would not aid in helping a tree to grow and that sufficient water and nutrients were the only manner trees could grow evenly.¹¹⁵ While these results are

¹¹² Ibid; Anonymous Representative of PowerTree #6, interview by Jason Smith, February, 2008; Anonymous Representative of PowerTree #7, interview by Jason Smith, February, 2008.

¹¹³ Anonymous Representative of PowerTree #5, interview by Jason Smith, February, 2008.

¹¹⁴ Anonymous Representative of PowerTree #4, interview by Jason Smith, February, 2008.

¹¹⁵ Office of News and Communications, Duke University. “Experiment Suggests Limitations to Carbon Divide ‘Tree Banking.’” <http://www.dukenews.duke.edu/2007/08/carbonadd.html> (accessed March 26, 2008).

pertinent in addressing the manner in which trees are planted, I do not believe a sufficient answer to the question of scientific support of carbon offset forestry was given.

Representative #7 said that “terrestrial carbon sequestration” was a misinterpreted issue, and that a Duke Study had confirmed that trees grew at an equal rate regardless of the amount of carbon dioxide. He also said carbon sequestration and measuring the carbon present in a tree was “simple arithmetic” and that it was possible to measure the amount of carbon stored by “measuring the diameter of the tree.”¹¹⁶ Other respondents such as Representatives #1 and #6 questioned how any person could be against planting trees and mentioned how no controversy existed over the natural process of photosynthesis.¹¹⁷

Another trend in the interviews I conducted was that every respondent mentioned the supplemental benefits of these projects. The strong emphasis on the ancillary benefits that come with each project’s execution and public appreciation of utilities “planting trees” also assists the companies in not having to address the reliability of carbon offsetting. If carbon offsetting is scientifically demonstrated to sequester carbon, then PowerTree can tell consumers it has succeeded in fighting global warming. If offsetting is not found to be scientifically valuable for countering climate change, then at a minimum, PowerTree can tell consumers that the forestry project was justified through the positive environmental action of planting trees.

The respondents also spoke of the “habitat restoration” benefits that the projects would bring. They mentioned the tragedy that the LMAV has gone from being twenty-two million acres of bottomland hardwood forest and now consisting of four million acres. It is questionable whether restoration efforts in planting 3,609 acres are of sufficient size to restore wildlife habitats that once consisted of twenty-two million acres. If twenty-two million acres once

¹¹⁶ Anonymous Representative of PowerTree #7, interview by Jason Smith, February, 2008.

¹¹⁷ Anonymous Representative of PowerTree #1, interview by Jason Smith, February, 2008; Anonymous Representative of PowerTree #6, interview by Jason Smith, February, 2008.

existed, a 3,609 acre contribution costing \$3million total from utility companies worth billions of dollars, it is difficult to consider their project a sincere manifestation of the companies' commitment to restoring the LMAV. Though the argument that small contributions can make an impact might be made, it is hard to see how planting trees on 3,609 acres will make an enduring mark on the devastation of 18 million acres of forest in the history of the LMAV.

Under the voluntary approach, the utility sector, at fault for releasing a majority of U.S. carbon emissions, is responsible for choosing which strategies to pursue in order to solve the problem of climate change.¹¹⁸ Companies will seek the cheapest strategies in order to maximize their profits. Carbon offset forestry is thus an enticing option used by the utility companies, though the scientific support that this activity counters global warming has not been solidified and, in recent years, has been disqualified to a degree.¹¹⁹ PowerTree demonstrates that members of the utility sector are planting of trees as carbon offsets and claiming reduced carbon emissions. Carbon offsetting is cost effective, and the publicity generated through presenting a "green" image allows consumers to feel safe about their emissions. These criticisms are part of a large body of criticism of carbon offset forestry in general, and opponents of this strategy have been producing arguments for nearly a decade.

Conclusion

In recent years, criticism of carbon offset forestry has intensified. Both scientific concerns and political concerns have emerged disputing carbon offset forestry as a practice. In a study published in the journal *Nature*, scientists at Britain's Hadley Center for Climate Prediction

¹¹⁸ Energy Information Administration. "Historical Data series: Energy-Related Carbon Dioxide Emissions by Fuel Type, 1949-2006."

¹¹⁹ Jha, Alok. "Planting trees to save planet is pointless, say ecologists." *The Guardian* (2005).

and Research found in computer models simulating global warming that planting trees was counterproductive to storing carbon successfully.¹²⁰ Dr. Geoff Jenkins, who was director of the Hadley climate change program, stated that there exist “a huge amount of uncertainties” in planting trees to offset future emissions.¹²¹ The non-profit organizations the World Wildlife Fund and Greenpeace International called on carbon offsetting and carbon sinks through forests to be disregarded by the Kyoto Protocol.¹²²

Both Greenpeace and the World Wildlife Fund continue to caution against the use of carbon offsetting if renewable energy alternatives are not sought and individuals make conscious decisions to emit less. Greenpeace warns in a press release that carbon offsetting is slight in countering climate change. The director of Greenpeace’s climate and energy campaign, Charlie Kronik, said “there is a risk that the fashion for off-setting could actually encourage people to take flights and unnecessary journeys.”¹²³ Keith Allot, director of the WWF-UK’s Climate Change Programme indicated that offsets may seem enticing and create a false sense of security when purchasing offsets and offsets may not encourage people to emit less. Said Allot, “If too much emphasis is put on easy options like offsetting rather than dealing with the root cause of climate change - our rampaging consumption of fossil fuels - then we will be doing little more than putting a sticking plaster on a severed limb”¹²⁴

Further studies would indicate the unreliability of carbon offset forestry as a method for countering climate change. The first study to refer to the albedo effect as hindering the goal of

¹²⁰ Cox, Peter M., Richard A. Betts, Chris D. Jones, Steven A. Spall, and Ian J. Totterdell. “Acceleration of global warming due to carbon cycle feedbacks in a coupled climate model.” *Nature* 408 (2000): 184.

¹²¹ Reaney, Patricia. 2000. “Studies question value of planting trees to slow warming.” Reuters. <http://www.mindfully.org/> (accessed March 26, 2008).

¹²² Ibid

¹²³ Greenpeace. “Greenpeace statement on carbon-offsetting.” (2007) <http://www.greenpeace.org.uk/> (accessed March 27, 2008).

¹²⁴ World Wildlife Fund. “Carbon offsets—handle with care.” (2007) <http://www.wwf.org.uk/news/> (accessed March 27, 2008).

carbon offsetting to have an impact on climate change was produced by Richard A. Betts in 2000. His findings suggest that planting trees in high-latitudes increases climate change due to the albedo effect.¹²⁵ A report published in 2005 by the Lawrence Livermore National Laboratory: Geophysical Research Letters revealed the same scenario that Betts had observed. Planting trees in areas outside of tropical zones near the equator may actually increase global warming.¹²⁶ Forests actually warmed the earth in zones above 50 degrees latitude. The warming is due in part to the albedo effect, or the extent to which something absorbs heat. The study found in part that vegetation in tropical zones absorbed more heat therefore producing greater average temperatures for the area measured. Professor Ken Caldeira of the study accused promoters of carbon offset projects of creating a diversion to justify a relaxed mindset of pollution and the study suggested that the results call for further research “before forest carbon storage should be deployed as a mitigation strategy for global warming.”^{127 128}

In Moises Velasquez-Manoff’s January 2007 article for the Christian Science Monitor, he discusses several key problems with monitoring the carbon offset forestry industry. A ranking of carbon offsetters released by Clean Air—Cool Planet rated three-fourths of 30 selected carbon offset companies 5 or below on a 1 to 10 scale with 10 being highest.¹²⁹ Many companies are moving toward offsetting their carbon emissions, and according to some market experts, some companies are simply seeking carbon offsets through forestry for earning a reputation of being a “carbon neutral” organization. Also explained in the article is the nature of the carbon offset in

¹²⁵ Betts, Richard A. “Offset of the potential carbon sink from boreal forestation by decreases in surface albedo.” *Nature* 408 (2000): 187.

¹²⁶ Gibbard, S. G., G. Bala, T.J. Phillips, and M. Wickett. “Climate Effects of Global Land Cover Change.” *Lawrence Livermore National Laboratory: Geophysical Research Letters* (2005): 01-18.

¹²⁷ *Ibid*

¹²⁸ Jha, Alok. “Planting trees to save planet is pointless, say ecologists.” *The Guardian* (2005). <http://www.guardian.co.uk/> (accessed October 29, 2007).

¹²⁹ Velasquez-Manoff, Moises. “Do Carbon Offsets Live Up to their Promise?” *The Christian Science Monitor* (2007).

the form of reforestation not having been carried out yet. Yet most actors in the debate seem to emphasize the need for development of renewable forms of energy as being a key method of curbing the greenhouse effect.¹³⁰

A *Financial Times* investigation in April of 2007 also revealed problems in the carbon offset model. The article, written by Fiona Harvey and Stephen Fidler, claims that a “green gold rush” has led companies to aim for carbon neutral status by offsetting greenhouse gas emissions. The investigation found that many organizations were buying credits that were not verified officially, and that many companies were unable to access the real value of their credits. Francis Sullivan, the environment adviser at HSBC, notices “serious credibility concerns” in the offsetting market. DuPont Chemicals was accused of inflating offsetting prices and overcharging customers to eliminate carbon dioxide from a plant in Kentucky. The *Financial Times* article illustrates some of the problems emerging from a market that has zero regulation.¹³¹

Carbon offset deals have also encountered political issues. An article published by the World Rainforest Movement revealed several political problems that developed at a carbon offset project in Uganda. It was discovered that, in 1995, the Dutch FACE Foundation agreed with Ugandan authorities to plant trees within Mount Elgon National Park. The project entailed planting rows of eucalyptus trees within the 211 mile long boundary of the park. But human rights abuses have been discovered in the implementation of the project. In 2002, before the commencement of the project the Ugandan Wildlife Authority, 300 families were evicted from the area and their crops and homes were destroyed.¹³² A 2007 Fortune article describes how some of the farmers evicted claimed UWA engaged in torture and violence against the farmers in

¹³⁰ Ibid

¹³¹ Harvey, Fiona, and Stephen Fidler. “Industry caught in carbon ‘smokescreen.’” *Financial Times* (2007). http://www.ft.com/cms/s/0/48e334ce-f355-11db-9845-000b5df10621.html?nelick_check=1.

¹³² Lang, Chris, and Timothy Byakola. “A funny place to store carbon: UWA-FACE Foundation’s tree planting project in Mount Elgon National Park, Uganda.” World Rainforest Movement (2006).

chopping down trees that had been planted.¹³³ Because no authority resides over the carbon offset forestry industry, there is zero monitoring of the host country's activity in carrying out carbon offset forestry projects.

Other problems arise with regulation of the carbon offset industry and terminology that governs contracts. An investigation into a carbon offset project in Scotland reveals that numerous groups and companies such as The Rolling Stones and Volvo paid to plant trees on property, but the trees were never planted. At a forest on the Orbost estate in northwest Scotland, an offset company called The CarbonNeutral Company [correct spelling] (TCNC) has been selling carbon offset forestry credits to corporations and individuals since 1997. Investigating for the Sunday Herald, Rob Edwards found that TCNC had been charging £10 to customers for the planting of an individual tree. But Edwards revealed that Future Forests, the firm contracted to grow the trees at Orbost, were actually paid £0.54 per tree. Responding to allegations of fraud, Sue Welland with TCNC assured that the costs of packaging and marketing fees rationalizes the price as "fair." But other groups in business with TCNC such as Volvo expressed concern over the price discrepancy.¹³⁴

Many will claim that initial groups' reaction to carbon offset forestry in the late 1980s was justified by sufficient scientific evidence supporting the theory, and many can argue that such groups could not have foreseen economic and political problems that could have arisen through the practice of carbon offset forestry. Though it is true that hindsight generally reveals the best paths, it is crucial to realize that early sources mentioning carbon offset forestry use a choice of words and affect a tone that implies a strong partiality towards this method as being a

¹³³ Faris, Stephan. "The other side of carbon trading." *Fortune* (2007). <http://money.cnn.com/> (accessed October 27, 2007)

¹³⁴ Edwards, Rob. "Revealed: the carbon offsetting forest farce ENVIRONMENT: EMISSIONS." *The Sunday Herald* (2007). <http://findarticles.com/> (accessed October 15, 2007).

risk-free solution to the increasing problem of climate change. Authors' overemphasis of the benefits of carbon offset forestry promoted its rapid ascension into the market with little analysis of its political and economic implications.

Carbon offset forestry seems to be a strategy pursued simply because of its cost-effectiveness, and this aim has been a critical part of President Bush's Climate Vision Program.¹³⁵ The act of planting trees to combat global warming is scientifically debatable. Many economists and policy analysts have questioned the mechanics of executing this model, citing lack of monitoring or oversight and difficulty in defining the properties of the voluntary carbon offset market. The development of the concept of carbon offset forestry is somewhat to blame for its widespread use in today's economy. In the 1980's and 1990's in attempts to find an elegant and practical theory to combat global warming, carbon offset forestry seems to have been put into action prematurely and without a wide collection of case studies supporting it in practice. Before political and economic questions of carbon offset projects were asked, many scientists and some economists encouraged companies to pursue carbon offset projects based solely on the scientific knowledge available at the time. Few recognize the problems associated with carbon offset forestry, yet it is predicted to continue to rise as an industry. While the viability of carbon offset forestry is scientifically debatable, companies will continue to use the method based on cost-effectiveness based on the encouragement of the Climate Vision Plan.¹³⁶

The carbon offset forestry model is expected to continue to rise as an acceptable means of offsetting carbon emissions.¹³⁷ Due to its relatively inexpensive nature, companies will seize

¹³⁵ Climate Vision. "Program Mission." <http://www.climatevision.gov/mission.html> (accessed March 27, 2008).

¹³⁶ Ibid

¹³⁷ Hamilton, Katherine, Ricardo Bayon, Guy Turner, and Douglas Higgins. *State of the Voluntary Carbon Markets 2007: Picking Up Steam*. Ecosystem Marketplace (2007): 4.

carbon offset forestry in order to claim environmental sustainability. Consumers and the public at large should be careful when companies claim less carbon emissions based on their employment of carbon offset forestry projects. While almost all scientists and economists agree the best way to reduce greenhouse gases is through reduction of use of fossil fuels and nonrenewable energy sources, the recent surge in carbon offset activity demonstrates a serious commitment to this practice despite its discovered flaws.¹³⁸

During the late 1980s, scientists avowed with great certainty that carbon offset forestry would be a short-term option for countering greenhouse gasses in the atmosphere. But if a voluntary market approach to reducing greenhouse gas emissions stresses economic profit over environmental stability then questionable and limited methods such as carbon offset forestry will be the strategies sought by industry to counteract global climate change. Though the scientific viability of carbon offset forestry is controversial, companies are eager to use this strategy in claiming environmental sustainability while maximizing economic potential.

¹³⁸ Capoor, Karan, and Philippe Ambrosi. "State and Trends of the Carbon Market 2007." The World Bank: International Institute - Reporting Services (2007) 03-46; Hamilton, Katherine, and Ricardo Bayon, Guy Turner, and Douglas Higgins. "State of the Voluntary Carbon Markets 2007: Picking Up Steam." New Carbon Finance (2007): 01-7.