

THE KYOTO PROTOCOL AND BRAZIL:

EFFECTIVENESS OF CLEAN DEVELOPMENT MECHANISM (CDM) PROJECTS

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Introduction

All across the world, in every kind of environment and region known to man, increasingly dangerous weather patterns and devastating storms are abruptly putting an end to the long-running debate over whether or not climate change is real. Not only is it real, it's here, and its effects are giving rise to a frighteningly new global phenomenon: the man-made natural disaster.'

In a speech on April 3, 2006 entitled “Energy Independence and the Safety of Our Planet,” President Barack Obama remarked on the irrefutable importance of mitigating climate change. While scientists have been studying the effects of climate change and warning the public about its detrimental and irreversible effects for decades, it has not been until recently that the world has started to pay attention and has made attempts to limit these effects. One of the most important organizations credited with “popularizing” the issue of climate change and with establishing arguably the most commonly accepted facts about climate is the Intergovernmental Panel on Climate Change, or the IPCC. The IPCC was established in 1988 as a joint initiative of the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). The IPCC focuses on the science of climate change and has the self-proclaimed objective of, “... provid(ing) the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.” The IPCC itself does not conduct research, but instead reviews research of scientists from around the world in order

to establish a well-informed consensus as to the current state of climate change in the world. Many pinpoint the success of the IPCC to its dual-nature of being grounded in science, but also of being an intergovernmental body involving the participation of countries that are participants in the United Nations and the WMO. The IPCC's latest report was "Climate Change 2007," which was pivotal in furthering the international community's understanding of climate change and in helping the organization win the Nobel Peace Prize in 2007.

Although initially scientists and green activists were at the forefront of the recent push towards containing the inevitable effects of climate change, individual countries and international groups have also made their own efforts to diminish their reliance on non-renewable sources of energy like oil and coal. One important step was the creation of the United Nations Framework Convention on Climate Change, or the UNFCCC, which was created primarily in response to the IPCC's Assessment Report in 1990, the organization's first publication that stressed the necessity of an international coalition to address successfully the environmental situation at hand. The UNFCCC is an international treaty among most of the countries of the world that calls on the international community to begin devising plans for how they will confront climate change together.

One of the major successes of the UNFCCC has been the creation of the Kyoto Protocol, which holds participant countries to individualized emission reduction targets. This represents the first international attempt to mitigate climate change in a legally binding way. While the Kyoto Protocol primarily involves the direct participation of industrialized countries, developing countries are involved indirectly through means such as the Clean Development Mechanism (CDM) projects. These projects represent efforts to reach the emission reduction targets for the industrialized countries, but also to help develop sustainable environmental practices within developing countries. One of the main ways that the CDM projects achieve this goal in developing countries is through the implementation of renewable energy projects, like the creation of wind farms, within these

countries. Throughout this paper, I will be focusing on the developing country of Brazil and assessing the effectiveness of CDM projects in modifying that country's environmental behavior. While it is obvious that the CDM project initiative of the Kyoto Protocol has prompted an increase in the number of renewable projects present in Brazil, mainly hydroelectricity dams, it is questionable whether the Kyoto Protocol has had any further positive environmental effect on the country.

I will begin by outlining the basics of the Kyoto Protocol and CDM projects. I will then focus specifically on the implementation of CDM projects in Brazil and on Brazil's environmental policy. What I will find is that the Kyoto Protocol and the CDM projects have not had as positive an impact in Brazil as had been hoped. I will then outline three hypotheses that could potentially explain the inadequacy of progress seen in Brazil. These three hypotheses, broadly stated, are: Brazil lacks the resources necessary to bring about meaningful change in its environmental policy; regardless of resources, Brazil lacks the will to change its environmental behavior; and finally the Kyoto Protocol itself is at fault for the lack of environmental progress seen in Brazil. What I conclude is that a fusion of all three of these hypotheses correctly explains Brazil's environmental behavior.

Overview of the Kyoto Protocol and the Clean Development Mechanism (CDM) Projects

The Kyoto Protocol was a protocol of the United Nations Framework Convention on Climate Change (UNFCCC), a treaty established in June of 1992. The UNFCCC had always been working towards mitigating the effects of climate change, but it was not until the Kyoto Protocol that the idea of a law-enforced international reaction would be put into place. The UNFCCC clearly states that the goal of the Kyoto Protocol is to create, "legally binding emissions targets that strengthen the world's reaction to the problem of climate change."

For each of the industrialized countries, known as "Annex I countries" in the

protocol jargon, the initiative sets legally binding greenhouse gas emission reduction targets applicable to the six principal greenhouse gases: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, HFCs and PFCs. Each of the Annex I countries is bound to achieve at least a 5.2% reduction of greenhouse gas (GHG) emissions below a baseline year defined as either 1990 or 1995, depending on the greenhouse gas, but most countries commit to more stringent targets. This, more precisely, means that each country must reduce emission levels at least 5.2% below those levels reported in 1990 or 1995.

Developing countries are not officially involved in the Kyoto Protocol, as they are not assigned emission reduction targets. That being said, many of the developing countries signed and ratified the Kyoto Protocol, like Brazil in 2002, and have pledged to try to reduce their greenhouse gas emissions without specific targets being assigned. Furthermore, many theorists like Babiker, Reilly and Jacoby argue that a sort of “ripple effect” from those industrialized nations with reduction targets to those countries without, mainly developing countries, will occur and in a sense force sustainable environmental practices on these other countries;

Economic trade links among countries will transmit effects of greenhouse-gas control measures adopted by one set of nations, in a ripple effect, to countries that may not have agreed to share the burdens of control. For example, emission restrictions under the Kyoto Protocol will increase the cost to Annex B regions of using carbon-emitting fuels, thereby raising manufacturing costs of their energy-intensive goods, some of which may be exported to developing countries. The restrictions also will lower global demand for carbon-emitting fuels, reducing their international prices.

Besides this “ripple effect,” there also exist three market-based provisions within the protocol, two of which encourage the participation of developing nations as well, even if in an indirect manner. These three market mechanisms are: Emissions Trading, the Clean Development Mechanism (CDM) and Joint Implementation (JI). These measures are not only a way of including the developing countries, but also they are an attempt to help

industrialized countries meet their targets and to increase the incentives for them to do so.

With Emissions Trading, each country receives allowances for its emissions. The number of allowances received by each country is equal to its emission reduction target, i.e. the level that is equivalent to the country's specified reduction below 1990 levels. The allowances are distributed to the countries in single units, called assigned amount units, or AAUs. The idea behind granting countries these allowances is that if a country reduces its emissions below its respective targets, it can then sell the extra allowances to another country to apply to its target. The exact details of Emissions Trading are described in Article 17 of the Kyoto Protocol:

The Parties included in Annex B may participate in emissions trading for the purposes of fulfilling their commitments under Article 3. Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article.

This mechanism has created a very competitive and profitable market, known as the carbon market.

The Joint Implementation mechanism is very similar to the Clean Development Mechanism. Each involves the creation of emission reduction projects; it is the location of these projects, however, that is the difference between JI and CDM projects. Joint Implementation projects are those that are managed by Annex I countries and located in another Annex I country. This leads to the creation of credits, known as Emissions Reduction Units (ERUs), for the managing country, and physical improvement of the environment in the industrialized country where the project is located. The Kyoto Protocol specifically outlines this process in Article 6:

1. For the purpose of meeting its commitments under Article 3, any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by

sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy...

Certain criteria must be met in order for a Joint Implementation project to be deemed legitimate. First of all, both countries involved must give their consent. Furthermore, the project must exemplify “additionality” and must follow the guidelines of the protocol. “Additionality” is the idea that projects must prove that they will be adding environmental benefits that would not otherwise be present. There are four steps to prove “additionality”: identification of alternatives, investment analysis, barrier analysis and common practice analysis.

For the purposes of this paper, I will be focusing on the Clean Development Mechanism (CDM) projects, which are outlined in Article 12 of the Kyoto Protocol:

2. The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.

This idea was proposed by Brazil at the original negotiations of the Kyoto Protocol; “In the Kyoto Protocol negotiations in 1997, Brazil proposed that differentiated targets for reductions in greenhouse gas emissions should be established, corresponding to each individual country’s historical contribution to the increase in global temperatures.” Under the Clean Development Mechanism system, projects that are established in developing countries can earn credits known as Certified Emissions Reductions (CERs). Each Certified Emissions Reduction is equal to one ton of carbon dioxide, often written as one CO₂e (one CO₂ equivalent). These reduction credits can then be applied to an industrialized

country's greenhouse gas emissions reduction target. CDM projects have been in existence since the beginning of 2006, and, to date, there have already been more than 1,650 projects registered, although many thousand more are in the validation process. Overseen by the CDM Executive Board, the registration and issuance of CER's for each project is an extensive process. The breakdown of the steps can be seen in Figure 1.

One of the main incentives for these projects on the part of the industrialized countries is that it is often cheaper to carry out the projects approved under the Kyoto Protocol in developing countries rather than in industrialized countries. And, in turn, many developing countries are attracted to the idea because it means a possible influx of foreign capital, fostering development in their countries;

...next to the objective of reducing GHG emissions, CDM projects shall also aim at supporting sustainable development in developing countries... a CDM project enables the transfer of a low-carbon technology to a developing country which would be in accordance with that country's development needs and priorities.

Although the industrialized countries are in charge of implementing the projects, the developing countries are responsible for the creation of a designated national authority (DNA) to oversee the implementation of CDM projects in their country. The DNA is responsible for approving CDM projects, using its country's personalized criteria for approval, before the CDM Executive Board can review the projects for approval. Most DNAs use an approval process that consists of two steps: a screening of the ideas for projects, followed by a final approval of the project design requests. The DNA also has the responsibility of reporting to the CDM Executive Board periodically and of determining additionality of projects.

There are a number of different ways that CDM projects can be funded and managed: by an Annex I country; by a group of Annex I countries working together; by non-Annex I

countries; by private companies; or by any mix of countries and/or companies. A dominant way that governments and private companies often pool their money is through the creation of an overarching fund, which can then be used to invest in CDM projects. One of the main funds established around the emergence of CDM projects is the World Bank's Prototype Carbon Fund, or PCF. The PCF was set up as a fund for governments and companies in Europe and Japan to use towards the development of CDM projects. It was established in April of 2000 with three main objectives: the creation of high-quality emissions reductions; knowledge dissemination; and the formation of public-private partnerships. The fund was created initially as a way to attempt to understand and test the procedures for creating a market for emission reductions generated through projects associated with the Kyoto Protocol, and more specifically with CDM and JI projects.

The Prototype Carbon Fund is comprised of "investors who want hands-on experience acquiring emissions-reduction credits under the CDM." Investors that comprise the PCF include governments of Canada, Finland, Japan, the Netherlands, Norway and Sweden and companies from Europe and Japan, including BP-Amoco, Norway's Statoil and Mitsubishi. Using contributions made by the companies and governments involved, the PCF invests these funds in projects designed to reduce emissions. The projects, focusing on areas such as biomass and reforestation, are consistent with the guidelines of the Kyoto Protocol and the framework for JI and CDM projects. After the completion of a project, each member of the PCF receives a pro rata share of the emission reduction credits generated from the project.

The PCF seems to focus a large portion of its funds in Latin American, primarily because the countries of Latin America have shown great eagerness to encourage carbon projects, even before the establishment of the Kyoto Protocol. Furthermore, Latin America has made huge strides towards developing the legal structures necessary for these projects to be successful:

'Latin American has the market orientation necessary for carbon trading, knows how the CDM works and has been extremely proactive in designing and promoting projects,' says Eduardo Dopazo, an Argentine consultant on the staff of the PCF.

In Latin America, the PCF has already invested in nine projects focusing on renewable energy, energy-efficiency and/or forestry projects. Of their total funds, 30% were invested in Latin America from 2000 to 2003, while 23% were invested in Eastern Europe, 20% in Africa and 12% in East Asia.

The PCF is not the only fund investing heavily in projects in Latin America. A study funded by the European Union estimates that there are a total of 789 CDM projects in Latin America. Of the total number of CDM projects in Latin America, Brazil is responsible for 41% of them, Mexico for 25% and Chile for 7%. Significant numbers of projects are also seen in Argentina, Colombia, Peru, Honduras, Ecuador and Guatemala. Of all the CDM projects in Latin America, projects focusing on renewables seem to dominate, making up 54% of the projects. Following renewables, one sees many projects focused on reducing emissions caused by agricultural practices and landfills. For further breakdown, please see Figures 2 and 3.

Many question whether CDM projects, like those instituted by the PCF, will actually benefit the developing countries of the Latin American region. Some are thoroughly convinced that these projects will be positive for the countries:

'This project has enormous social benefits,' says Marta Castillo, head of the office within Colombia's Environment Ministry that prepares projects under the Kyoto Protocol. 'It shows how the PCF can stimulate projects in Latin America and benefit poor communities.'

Other possible benefits of CDM projects for countries in Latin America are generating

jobs, restoring the environment, reducing pollution and improving public health. On the other hand, people have raised questions about the potential negative effects of these projects. For example, some CDM projects have the capability of destroying the natural habitats of both people and animals, causing more greenhouse gas emissions than mitigating and not confronting the true environmental problems from which the host country is suffering.

Effectiveness of Brazil's Environmental Policies

In this section, I will focus on Brazil's specific involvement in CDM projects with the goal of determining the effectiveness of the country's environmental policy in general. I will first outline the specifics of Brazil's involvement in the Kyoto Protocol through its CDM projects and discuss why there is such a large number of projects in Brazil compared to the rest of Latin America. Subsequently, I will define a proper measure to judge effectiveness of Brazil's CDM projects and environmental policies, in general, in order to come to a conclusion as to whether or not CDM projects have been effective in Brazil.

As has been mentioned before, Brazil is the third largest contributor of CDM projects in the world and is the leading contributor in the Latin American region. Of the total expected average annual CER's from registered projects worldwide, Brazil is estimated to be responsible for 6.52% of them, which is equivalent to an estimated 2,019,987.4 credits. For a further breakdown of CER generation by country, please see Figure 4. According to the UNFCCC website, Brazil has 164 registered projects, excluding a considerable number of projects that are in the process of registration and validation. These projects account for about 8.93% of the total number of registered CDM projects, which is approximately 1,873 projects. For more information about the registered CDM projects by host country, please refer to Figure 5.

According to a study conducted by the United Nations Environment Programme (UNEP) Risoe Centre on Energy, Climate and Sustainable Development in January 2009, the state of São Paulo has the highest concentration of projects among the regions of Brazil.

These projects in São Paulo represent 99 out of an estimated country total of 424 projects, including both those that are registered and those that are unregistered. Other states with notable numbers of CDM projects are Minas Gerais with 66 projects, Rio Grande do Sul with 36 and Santa Catarina with 34 projects. The methodology of methane avoidance is the most prominent in Brazil with 125 of the projects making use of this technology. Methane avoidance is a technology that can take many forms, but generally involves the capturing of methane that otherwise would be released into the atmosphere and transforming captured methane into a more environmentally friendly form, like energy, for example, through its combustion in the cogeneration process. Biomass energy comes in a close second behind methane avoidance with 106 of the projects in Brazil using this clean energy method. Many other projects in Brazil also use hydro (84 projects) and landfill (45 projects).

Being the third largest host country of CDM projects in the world and the largest in Latin America, Brazil has shown a major commitment to CDM project implementation. One might ask why there exists such a large number of projects in this country? First of all, Brazil is the largest country in Latin America and is often looked to as the leader of the region; therefore, it is not surprising that Brazil would also lead the region in its involvement under the Kyoto Protocol. Brazil also has the strongest economy in comparison to the rest of the countries of Latin America. In terms of GDP ranking in 2009, Brazil was ranked 10th in the world, followed by Mexico in 12th place and Argentina in 24th. Another reason for Brazil's exemplary CDM project implementation is that it is one of the largest emitters of greenhouse gases in the world. For this reason, it is under the most scrutiny among all the Latin American countries to take action to mitigate its negative environmental impact. In a study conducted by the Union of Concerned Scientists in 2006, Brazil was ranked the 17th highest emitter in the world in terms of total emissions, emitting an estimated 377.24 million metric tons of carbon dioxide, which equates to 2.01 tons per capita. Please refer to Figures 6 and 7 for more information.

Despite the considerable number of CDM projects in Brazil, are these projects

proving to be effective? And how is effectiveness actually measured? If I consider effectiveness in a narrow sense to be a reduction of greenhouse gas emissions, Brazil has not seen a reduction in total emissions since it began participating in the Kyoto Protocol's CDM mechanism in 2002. In 1995, Brazil's emissions equaled an estimated 289.53 million metric tons of carbon dioxide. This level then increased to 344.93 in 2000 and up to 377.24 million metric tons in 2006. However, even though there is not a decrease in total emissions, there has been an overall reduction in the growth rate of Brazil's emissions. Between 1995 and 1996, there was a 6.09% increase in emissions. Comparatively, the growth rate decreased to 1.2% from 2000 to 2001 and increased only slightly to 1.78% from 2005 to 2006, but still remains a decrease from the 1995-1996 period. This shows that although the total amount of emissions is still increasing since the initial negotiations of the Kyoto Protocol in 1995, Brazil's rate of increase of emissions, for the most part, has declined.

Because Brazil is not an Annex I country, it is not legally bound to reduce its emissions in any way under the Kyoto Protocol. But the fact that Brazil is still, even without mandate, taking initiative to halt its growth of emissions through the implementation of CDM projects is noteworthy. Many of these CDM projects, for example, have focused on increasing reliance on renewable energy, a sector that was already existent in Brazil prior to the implementation of CDM projects but that has been greatly strengthened with the creation of the CDM. Brazil is even considered to have one of the cleanest energy sectors in the whole world. Resulting from this relatively clean energy sector, in comparison to the United States, energy emissions in Brazil are 0.50 tons of carbon per person, while in the United States this number is drastically higher at 5.58 tons of carbon per person. Therefore, one can see that while not mandated to cut its emissions under the stipulations of the Kyoto Protocol, Brazil is still playing a significant role through its production of renewable energy.

Part of this excellence in terms of renewable energy production can be attributed to

Brazil's manufacturing of ethanol from sugarcane. Brazil's ethanol is one of its renowned technologies, and its production has proven to be a model for the rest of the world. Ethanol proves to be a viable and renewable substitute for gasoline and, because of its renewability, is better for the environment; "Brazilian ethanol from sugarcane can cause a 70-90% reduction in greenhouse gas emissions when compared to gasoline." For almost three decades, Brazil has been using ethanol as a substitute for fossil fuel, which has drawn the attention of many other countries like the United States. In a meeting with President Luiz Inácio Lula da Silva, President Barack Obama admitted his admiration of Brazilian ethanol production;

'I have a lot of admiration for the big steps that the Brazilian government has taken in its development of biofuel. It is an investment to which Brazil has been dedicated for a long time. My policy with regards to biofuel is that the United States needs to focus its attention towards finding the same potential for clean energy. We must learn together with Brazil.'

Brazil's ethanol production from sugarcane is definitely contributing to the fight against climate change, specifically by reducing emissions usually caused by gasoline. Besides ethanol, other renewable technologies that contribute to Brazil's clean energy sector are biomass energy and hydroelectricity.

Even with its involvement in CDM projects and its ethanol production, is Brazil doing enough to help mitigate its contribution to climate change? Is participation as a host country for CDM projects and its production of ethanol sufficient to qualify Brazil as a serious proponent of environmental improvement? Although the focus of CDM projects is on reduction of emissions, one must look further and assess the environmental implications of these projects more generally. The implicit goal of CDM projects is reduction of emissions, but furthermore, it is to develop sustainable behavior within the country where

the projects are implemented;

...in accordance with Article 12, the purpose of the clean development mechanism is to assist Parties not included in Annex I to the Convention in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3 of the Kyoto Protocol.

The renewable sector in Brazil does not seem to be a major problem for the country, as it is one of the cleanest in the world and has the potential for significant growth in the future. However, although making strides in its production of renewable energy, including its production of ethanol, there are two major problems with Brazil's environmental policies: the use of questionable technologies, like hydropower, and the fact that CDM projects do not focus on the true environmental problems that the country is facing.

The first of Brazil's problems with its environmental policy is that some of the techniques used to achieve development in its renewable sector are extremely controversial and have negative environmental implications. Prime examples of this are hydroelectric projects; the Kyoto Protocol has received much criticism for its acceptance of such projects as an approved CDM. With hydroelectricity, it is questionable whether the environmental benefits of this mechanism outweigh its environmental destruction. These projects often involve the destruction of natural habitats and the resettlement of a large number of people. For example, in two different dam projects implemented in the 1980's by the World Bank in Sobradinho and Macadinho, in northeastern and southeastern Brazil, the resultant number of displaced people reached about 70,000. Besides being displaced, those displaced did not even receive adequate compensation for the hardships they experienced from their displacement.

Besides displacing locals, hydroelectricity can also pose a danger to the lives of

inhabitants in the vicinity of the dam;

Imagine people encircled by water from all sides, running for [the] safety of their lives. Many of them climbed over trees. Their houses and other properties washed away. Boribinda, Gopalur, Durrie and Birdih are a few villages among 52 villages in the state of Bihar which were submerged during August 26-27 [1991] due to the ongoing construction of the Chandil dam...

Besides physical destruction to surrounding environment, many also question whether the dams are actually improving the energy matrices, i.e. making the electricity grids “cleaner.” It is estimated that hydroelectric dams have the potential of emitting higher levels of carbon dioxide and methane than power plants that run on fossil fuels:

This is because large amounts of carbon tied up in trees and other plants are released when the reservoir is initially flooded and the plants rot. Then after this first pulse of decay, plant matter settling on the reservoir’s bottom decomposes without oxygen, resulting in a build-up of dissolved methane. This is released into the atmosphere when water passes through the dam’s turbines.

For example, Philip Fearnside of Brazil’s National Institute for Research in the Amazon in Manaus estimates that the emissions from the hydroelectric dam of Curuá-Una in Pará, Brazil in 1990 were three-and-a-half times larger than the emissions that would have been generated had the same amount of electricity been produced using oil.

Besides the dams in Sobradinho and Macadinho described above, hydro is prevalent throughout Brazil, as 76% of its energy is generated from hydro technology. Not only does the Kyoto Protocol allow hydropower to be included as a methodology, Brazil has also made efforts to increase investment in this methodology. President Lula da Silva’s

administration has even changed the power sector regulations to increase the attractiveness of investing in hydropower by decreasing environmental risks to investors; “The new regulations mean that hydropower projects cannot be presented to public tender until after the governmental energy planning agency grants an environmental license.” The guaranteeing of an environmental license means that once up for public tender, the projects will have lower risk of disapproval than those projects put up that may or may not be granted an environmental license. This relaxing of the regulations surrounding the implementation of hydropower projects has led to a large increase in the number of dams in Brazil, thus making hydropower projects the third most implemented type of renewable project in Brazil.

Although the renewable CDM projects seem to be flourishing in Brazil despite their use of questionable renewable techniques, Brazilian CDM projects, for the most part, do not truly address the major environmental problems that the country is facing. While for most countries in the world their energy sector contributes to the majority of greenhouse gas emissions, it is the unsustainable land use and forestry that contribute the most to greenhouse gas emissions in Brazil. In 1994, only 17% of Brazil’s emissions came from energy production, while 81% came from agriculture, land use and forestry. For further breakdown of Brazil’s emissions, please see Figure 8. The country presents an atypical emissions profile that can be categorized as LULUCF, Land Use, Land Use Change and Forestry. Instead of focusing on the real environmental problems at hand in Brazil, i.e. problems caused by agriculture, land use and forestry, Brazilian CDM projects primarily focus on renewable technologies like hydropower.

One of the main environmental problems that Brazil is facing is deforestation; “At the current rate of deforestation, around one-third of the forest in Amazonas (a state in the Amazon region of Brazil) will have been lost by 2050, releasing a colossal 3.5 billion tonnes of carbon dioxide into the atmosphere.” The Brazilian Amazon rainforest lies primarily in the Northern region of the country and is made up of the states of: Acre, Amazonas, Pará,

Roraima, Amapá, Rondônia, Mato Grosso and Tocantins. In a study conducted in 2008 by the Instituto Nacional de Pesquisas Espaciais (Inpe), it was estimated that the area of deforestation that has already occurred in Brazil to date is bigger than the total area of the three states that make up the southern region of Brazil: Paraná, Santa Catarina and Rio Grande do Sul. This area is equal to over 576,000 square kilometers of land. It was further estimated, that in the last five months of 2007, 1,250 square miles of forest suffered from deforestation in Brazil.

Some of the main causes of this deforestation are: the growth of the Brazilian population, logging, cattle herding, the construction of hydroelectric dams, the building of roads, mining and grain production. The main impacts caused by such high rates of deforestation are: the loss of some of the most precious biodiversity in the world, a change in wind patterns and the releasing of huge quantities of greenhouse gas, primarily carbon dioxide, into the atmosphere. While the deforestation is occurring within the boundaries of Brazil, most of its effects have repercussions for the world as a whole. Experts have estimated that if this problem is not dealt with, it will become an even larger problem in the near future, because even if Brazil is not currently experiencing the effects of climate change, it will start to feel them very soon. As Fearnside argues, "...the vastness of the remaining forests means that the impacts of continued clearing are far more serious than the – already severe – impacts resulting from their loss to date."

Unfortunately, given such high rates of deforestation, one does not see Brazil trying to reduce its reliance on deforestation, and the country has even claimed a right not to be mandated to reduce its deforestation, or to reduce any of its emissions for that matter, in potential future international agreements after the termination of the Kyoto Protocol in 2012;

In international negotiations, Brazil points out that climate change is driven more by the accumulation of greenhouse gases in the atmosphere than by yearly emissions, primarily because the most important greenhouse gas (carbon dioxide) remains in the

atmosphere for more than a century on average. Yearly emissions data therefore generally overestimate developing countries' contributions to climate change, and underestimate that of developed countries. Brazil therefore says that it will not limit its greenhouse gas emissions until the middle of the century (around 2050).

Adding to the country's refusal to be mandated to reduce its emissions, particularly those related to deforestation, the Kyoto Protocol under its CDM projects does not give any incentive to developing countries to avoid deforestation. For the first commitment period of the Kyoto Protocol culminating in 2012, the avoidance of deforestation was not included as an approved CDM methodology;

Investment interest in carbon with a view to short-term returns is likely to be limited, given the fact that the agreement over the Kyoto Protocol reached in July 2001 excludes credit for forest maintenance in the Clean Development Mechanism (CDM) during the protocol's first commitment period (2008-2012). Should this be allowed in future commitment periods, Brazil could potentially gain substantially from CDM projects to reduce deforestation.

While neither the country of Brazil nor the Kyoto Protocol seem to be prioritizing avoidance of deforestation, one also does not see a significant drive towards reforestation within Brazil. The technique of reforestation, put simply, is the planting of trees in a plot of land where forest has been cleared in an attempt to gain back the lost forest. Although many consider reforestation as a mechanism to undo the effects of deforestation, the advantages that come from reforestation do not nearly right the harm that comes from deforestation;

But some experts doubt replanted forests provide reliable storage for atmospheric carbon. They say carbon must be stored for at least 100 years to benefit the atmosphere since that's how long a CO₂ molecule remains in the atmosphere before being reabsorbed

As the attempt to mitigate the effects of deforestation through reforestation seems to be unsuccessful, one must not consider these two mechanisms as necessarily coupled together. Instead, reforestation should be a methodology instituted to help the environment, while deforestation should be a methodology avoided, as it is destructive to it.

In the case of Brazil specifically, the country does not engage in the positive technique of reforestation and instead engages in the negative one of deforestation. Brazil must attempt to stop this deforestation before its effects are irreversible. Even though developing countries were initially not included in the Kyoto Protocol because it was the general consensus that these countries should have the same opportunities as the industrialized had when developing (for example, the absence of emission reduction targets), this general consensus has shifted somewhat, in part due to Brazil's uncontrolled rates of deforestation, and it is suggested that these developing countries should play a more active role in this fight to combat climate change.

Although making huge strides in producing renewable energy through initiatives like CDM projects, Brazil needs to focus its attention more on the environmental problems at hand, specifically the deforestation of the Amazon and the usage of questionable technologies like hydropower. Besides helping the industrialized countries achieve their emission reduction targets more easily, the CDM projects are also intended to promote sustainable environmental behavior within the countries in which these projects are implemented. Because of the persistence of serious environmental problems in Brazil without an effort to combat them, the effectiveness of CDM projects in Brazil can be disputed.

Explaining Inadequacies in Brazil's Environmental Policies

I will now discuss potential reasons why CDM projects in Brazil have not been

successful in addressing the larger environmental issues at work in Brazil in an attempt to come to a conclusion about the projects' overall effectiveness within Brazil. The CDM projects have helped in reducing the growth of emissions within the country, but they have not helped to deal with Brazil's more pressing problems of deforestation and usage of the controversial renewable technology of hydropower. In order to address this concern, I will be considering three different hypotheses. Two of the hypotheses will approach the issue at a domestic level. And the third hypothesis will deal with the concern at a more international level.

The first hypothesis focuses on resources. Perhaps Brazil is committed to improving its environmental performance, but because it is a developing country, it does not have the means to realize truly its environmental aspirations. As a number of theories of economic growth and development suggest, resources, particularly capital that can be used for investment, greatly influence a country's ability to achieve development. The lack of these resources has made this task extremely difficult for developing countries. For example, in his book *The Elusive Quest for Growth*, William R. Easterly outlines an idea, originally put forth by Evsey Domar, which suggests that in order to achieve economic growth, a country requires more capital; "...the growth rate of GDP was proportional to last year's investment/GDP. Foreign aid and private finance were to fill the financing gap between saving and the necessary investment to get high growth." As has been stated here, this investment usually comes in the form of foreign aid;

The difference between the required investment and the country's own savings is called the financing gap. Private financing is assumed to be unavailable to fill the gap, so donors fill the financing gap with foreign aid to attain target growth. This is a model that promised poor countries growth right away through aid-financed investment. It was aid to investment to growth.

A central problem for developing countries is finding sufficient capital to fund economic development. Without the funds to cover central things like developing economically, it is no wonder that these same countries will not have enough capital to develop environmentally.

Additionally, even if capital became available for environmental development within these countries, change in environmental behavior does not come at a cheap price. Renewable technologies like solar, for example, are extremely expensive alternatives to non-renewable technologies. Furthermore, the rates of return on the implementation of some renewable technologies will not be immediate. A good portion of industrialized countries and definitely in developing countries where resources are scarce will probably veer away from an investment with a long pay-back period and instead choose one where the pay-back period is shorter;

The trouble with mitigating climate change is that the benefits are uncertain and distant. Compared with investments that deliver clear benefits in the near future—such as education in developing countries, for instance, which commonly produces returns of around 10% a year—they do not look worthwhile. Conventional analysis would therefore suggest that those who want to make the planet a better place should invest in school in Malawi rather than in clean energy.

Because of the steep costs associated with technologies that work towards dealing with the problem of climate change and because of their lagging rate of returns, it is almost obvious why implementation of such technologies in developing countries are not these countries' priority.

Besides a dearth of economic resources to effectively create environmental change, developing countries like Brazil also may not have the political resources to stimulate this change. Complex legislation and overall growth of a society are often the products of

effective institutions within a country. As Dani Rodrik argues in his paper “Institutions for High-Quality Growth: What they are and how to acquire them,” there are certain types of institutions of great importance for the stimulation of economic growth of a society. Rodrik breaks the kinds of institutions that support this growth into five basic categories: “property rights; regulatory institutions; institutions for macroeconomic stabilization; institutions for social insurance; and institutions of conflict management.” In describing these five different types of institutions, Rodrik stresses that there is not one model of implementation of these institutions that can be applied to each country. Various factors must be considered and accounted for in the implementation of any institution; “...there is no single mapping between the market and the set of non-market institutions required to sustain it.” Besides diversity of implementation and type of institutions, Rodrik further argues that the adoption of the right kind of institutions is a stimulant for growth within a society;

Think of institution acquisition/building as the adoption of a new technology...

Let us call this new technology a “market economy”...Adoption of a market economy in this broad sense moves society to a higher production possibilities frontier, and in that sense is equivalent to technical progress in economist’s parlance.

The cruel irony of Rodrik’s idea about institutions and growth is that unlike industrialized countries, developing countries often do not have the leisure of focusing on developing effective institutions. Due to limits on resources, they are instead forced to concentrate on resource extractions and development. Without these effective political institutions, a country is unable to achieve such growth that comes from institution creation, which is often a necessary component for legislative change. Concentrating on the situation of Brazil, implementing changes in environmental policy involves the creation of complex legislation. Brazil may not have the necessary resources to develop institutions to create such economic growth and subsequently such complex environmental legislation.

Our second hypothesis is that Brazil is not committed to its environmental performance at all, regardless of whether or not it has the resources to instigate changes in its policies or not. According to realist perspectives, there are five basic assumptions that states make about the international relations that lead to a semi-pessimistic view of the international system. Theorist Mearsheimer outlines these five assumptions in an article entitled “The False Promise of International Institutions” and they are: the international system is anarchic; states, with their militaries, have the capability of harming and even destroying each other; the intentions of states are unknown to each other; states are driven by the motive to survive; and, finally, states are rational and think strategically about their survival in the international arena. Taken together, these five basic assumptions used to explain the behavior seen in the international setting instill a sense of fear and a drive to fight for survival among the states. Furthermore, states seek to maximize their relative power to other states, usually through building their economies and militaries, a condition that gives states a sense of security in the competitive international setting that realists depict. When making decisions, states use a cost-benefit analysis to determine which action will further their economic and security interests. In this sense, Brazil, in assessing competing demands on resources and time, has determined that protecting the environment is not in its self-interest compared to advancing its economy. Brazil is more concerned with developing economically and, therefore, its environmental goals take a back seat to furthering the economy.

Our final hypothesis approaches the issue of lack of sufficient progress in environmental policy in Brazil with a more international scope, looking at the institution of the Kyoto Protocol as a whole, instead of focusing specifically on Brazil. This idea states that the problem is not that of Brazil, but instead of the Kyoto Protocol. There are two potentially central problems with the international institution of the Kyoto Protocol that might jeopardize the effectiveness of its implementation in countries like Brazil. The first problem with the institution is that there was not enough incentive given to the developing

countries to modify their environmental behavior and, subsequently, the countries did not prioritize adaptation of their environmental behavior towards more conscientious practices. As I have explained at the beginning of this thesis, the Kyoto Protocol only sets legally binding standards for Annex I countries. This inclusion of solely Annex I countries could be the result of many different factors. First, coming to an agreement on how to address the problem of climate change is never an easy task. Besides the sheer number of countries involved, making it hard for consensus to be reached, the developing countries were also not completely on board with the idea of being involved in the aftermath of a problem that they felt they played no part in causing. The principal stance of developing countries in the Kyoto Protocol negotiations was that this was a problem caused by industrialized countries and, therefore, it was their responsibility to fix it. In the Georgetown International Environmental Law Review in 1999, Deborah Cooper points exactly to this point that developing countries feel it would be unfair for them not to be allowed to grow without restriction, as industrialized countries had done during their industrialization period;

Developed countries profess that stringent controls on all sources of GHGs in China and other developing countries will be necessary to prevent significant global warming. But such measures are viewed as offensive to developing countries like China – tantamount to telling these nations to stay poor. The message of restricted development touted by the develop world is seen as hypocritical since no one told them to halt their own industrialization for the sake of the environment.

China's senior energy researcher at the State Planning Commission in Beijing furthers this point about limiting energy use on developing countries by saying, "You try to tell the people of Beijing that they can't buy a car or an air-conditioner because of the global climate-change issue...It is just as hot in Beijing as it is in Washington." This popular stance by developing countries caused a tension between developed and developing countries during

the Kyoto negotiations over the issue of whether or not all countries should all be held to the same standard. Furthermore, there exist huge economic disparities among the countries of the world and because of this it is likely that countries with weaker economic situations would be hesitant to invest resources in climate change mitigation and in meeting legally binding targets.

For this reason among many others, the developing countries of the world were not delegated an active role in the Kyoto Protocol. Because of this, strong incentives were not created for the developing countries to reduce their emissions, as was the case for the industrialized countries. Without these strong incentives, developing countries did not feel the pressure to curb their emissions and, therefore, could not be held accountable for questionable environmental practices. The only way that these countries are motivated to curb their emissions by the Kyoto Protocol is through the CDM projects, but this encouragement is limited.

The second problem with the Kyoto Protocol that potentially causes its ineffectiveness in countries like Brazil is that the CDM includes projects that are not ideal given their broader environmental implications for the countries in which the projects are implemented. In analyzing the claim that the Kyoto Protocol has led to the suboptimal result that it includes projects of questionable value, I will first look at more general theories with regard to the design of international institutions. A debate exists in international theory over how international institutions should be designed. One of the main views of how international institutions are designed comes from a tradition known as the rational-choice analysis. Theorists Kormenos et al. subscribe to this rationalist ideology and argue that, "...states use international institutions to further their own goals, and they design institutions accordingly." Furthermore, rationalists believe that the creation of international institutions is the result of states weighing the costs and benefits of issues and coming to agreement over the best way to further their own self-interests; "...actors have (well-behaved) preferences over various goals; and the pursuit of those goals is guided by their beliefs about

each others' preferences and their relative costs and benefits of different outcomes; and actors are constrained by their capabilities." In the specific case of the Kyoto Protocol, this would mean that the states participating in the negotiations of this agreement would have weighed the costs and benefits in order to best address the issue of climate change.

While rational-choice theory provides a somewhat convincing explanation of how international institutions are created, the theory fails to take into account key factors, like the behavior of the institutions after they are created, which are covered by the constructivist view of international institution design. For this reason, in order to explain the Kyoto Protocol's inclusion of technologies that do not have optimal environmental effects for the countries in which they are implemented, like Brazil, I will utilize the constructivist argument on institutional design. Constructivists Barnett and Finnemore in their paper entitled "The Politics, Power and Pathologies of International Organizations" argue that international institutions, "...can become autonomous sites of authority, independent from the state 'principals' who may have created them..." The theorists further claim that the enormity of international institutions can render them inefficient and ineffective;

...the folk wisdom about bureaucracies is that they are inefficient and unresponsive. Bureaucracies are infamous for creating and implementing policies that defy rational logic, for acting in ways that are at odds with their stated missions, and for refusing requests and turning their backs on those to whom they are officially responsible.

Moisés Naím makes a similar claim about the size of international institutions causing problems for effective international foreign policy being achieved in his article "Minilateralism." Throughout the article, Naím argues that international response is necessary for some of the world's most pressing issues like climate change, but he also points out that the number of actors involved in addressing these issues must be limited;

We should bring to the table the smallest possible number of countries needed to have the largest possible impact on solving a particular problem. Think of this as minilateralism's magic number...Same with climate change. There, too, the magic number is about 20: The world's 20 top polluters account for 75 percent of the planet's greenhouse gas emissions.

Naím swears that although those left out of negotiations will not like the idea of limiting the number of actors involved, the advantages of the small number, like not being caught in a stalemate, will outweigh the small disadvantages.

Utilizing the constructivist logic of Barnett and Finnemore and Naím's argument, one can make the claim that the Kyoto Protocol is potentially too large and bureaucratic with 130 countries involved that it often becomes inefficient. Because of this inefficiency and ineffectiveness seen in institutions like the Kyoto Protocol, it would make sense that some corners would be cut in the negotiations process in order to facilitate action actually being taken, instead of no agreement being reached at all. For this reason, the focusing of the Kyoto Protocol on technologies that are easier to implement, such as hydroelectricity, is relatively easy to understand. This emphasis on hydroelectricity is upsetting for true environmentalists since it is, as has been previously stated, a highly controversial technology.

Besides over-emphasis on hydroelectricity, there is little emphasis placed on deforestation, the major environmental problem that Brazil faces. One element of institutional design scholars have focused on is the influence and distribution of voting power, which can lead to suboptimal results like those seen in the Kyoto Protocol. For example, many institutions do not give developing countries a principal role both in its creation and in its maintenance. The Kyoto Protocol is of this type of institution; the design is such that the developing countries are not active participants in the emission reduction scheme. As the developing countries are not involved in the Kyoto Protocol directly, this leads to it being a flawed institution in facilitating real change and real environmental strides

in developing countries like Brazil. Instead, the Kyoto Protocol only focuses on the Annex I countries that are the direct participants in the institution. This lack of emphasis on developing countries has resulted in the exclusion of deforestation as a CDM technology. Potentially, this is a result of the industrialized countries' framing of the Kyoto Protocol being shaped by their own experiences with environmental problems where renewable energy was their priority, not deforestation.

Analysis of These Explanations

Lack of Resources

To restate, the first hypothesis to be examined is that Brazil does not have the means necessary to achieve change in its environmental policy. This lack of means can be viewed as a lack of financial capital to induce change or a lack of the necessary legislative power to enforce change. Let us first concentrate on a lack of economic means to stimulate change. Looking at the economic standings of those countries producing large improvement in their environmental policy like the United States and Japan, these countries have significantly more economic capacity, which can be directly linked to a capacity to improve environmental behavior. Compared to the United States and Japan, Brazil is still considered a developing country and, therefore, does not have as much flexibility to dedicate its resources to the environment as a fully industrialized country would. Although Brazil's economy has been applauded in recent years, especially for its miraculous recovery from the financial crisis of 2008, the country still sits in the upper-middle income countries bracket and not in the high-income countries bracket, as designated by the World Bank.

Further utilizing information from the World Bank, Brazil can be compared to the United States and to China. The United States is used to compare Brazil to an industrialized country that is part of the Organization for Economic Co-operation and Development (OECD), which consists of thirty developed countries that are considered high-income

and that are committed to democracy and to the maintenance of a market economy. And China is used to compare Brazil to another developing country that is also targeted by the international community for its high emission rates of greenhouse gases (in the case of China, the highest emissions rates for a developing country). Comparing the GDP's of these three countries in 2008, Brazil's GDP is far below the other two at 1.58 trillion (US\$), while China's is 4.33 trillion (US\$) and the United States' 14.09 trillion (US\$). In comparing Brazil's GNI per capita at PPP in 2008 to those of China and the United States, one sees that Brazil sits between China and the United States. Brazil's GNI per capita at PPP stood at 10,080 (current international \$), while China's was lower with 6,010 (current international \$) and the United States' higher with 46,790 (current international \$). Finally, Brazil's inflation rate in 2008 of 6% was 1% lower than China's in the same year and 4% higher than that of the United States.

While not achieving the same economic status as the OECD country of the United States, and as China in terms of GDP, Brazil has been a major focal point in the world recently, especially due to its miraculous recovery after the economic crisis of 2008, which left the economies of traditionally “unstoppable” countries like the United States in disarray;

What appeared to be the worst global recession since the 1930's left Brazil relatively unscathed. It was able to cut interest rates and the real held its value. Brazil turned out to be one of the last countries into the downturn and one of the first out, causing national celebration and not a little surprise, given what had gone before.

The country is achieving a feat it has never accomplished before: democracy, economic growth and low inflation. The country has experienced each of these separately and in groups of two over its history, but never has Brazil had all three working in unison in the way that they do now. For example, starting in 1964 under the country's newly instated military government, Brazil experienced what was deemed “O Milagre Econômico

Brasileiro,” or the Brazilian Economic Miracle. As can be seen in the Figure 9, during the time that Brazil’s military regime (1964-85) ruled the country, the country saw astounding GDP growth rates, “taxas de crescimento do PIB,” up until the 1980’s. Authors Viola and Mainwaring describe the economic situation of Brazil during this period as follows, “Based on an income concentrating model, the Brazilian economy expanded at one of the fastest rates in the world between 1967 and 1980.” During this time, Brazil experienced unprecedented economic growth, but suffered immensely from extremely high interest rates and from a repressive military government, which was far from democratic.

The current state of Brazil with democracy, economic growth and low inflation can be attributed largely to the exemplary presidency of Lula’s predecessor, Fernando Henrique Cardoso, who was in power from 1995 to 2003. Cardoso is responsible for taking the reigns of the economy and steering it in the direction of stability. Before assuming his role as president in 1995, Cardoso served as Brazil’s finance minister and was mainly responsible for the country’s adoption of the Plano Real. This plan involved the introduction of a new currency, the Real, which uses a floating exchange rate. As former U.S. President Bill Clinton notes in his foreword to Cardoso’s memoir,

Cardoso’s economic strategy as finance minister, the Plano Real, succeeded in curbing the hyperinflation that was crippling Brazil’s economy. Halting inflation dramatically boosted the real incomes of the poor, created a solid foundation for economic growth, and protected the country from many of the financial crises that have afflicted other developing nations.

While Cardoso was responsible for the meat of the policies implemented to ignite the wondrous economic growth seen in Brazil today, Lula da Silva has also continued to follow the measures set by Cardoso and has added a few measures of his own.

Looking at hard data from the period before Cardoso’s presidency up to the

current period with Lula as president, one can see overall improvements and prosperity of the Brazilian economy. I will use the year 1990 as illustrative of the time immediately preceding Cardoso's Real Plan and his time as president. The year 1995 represents the year following the implementation of the plan and Cardoso's first year as president. I will finally utilize the year 2008, as it provides the most recent data available and will demonstrate the improvements seen in Brazil's current economy and the economy under President Lula. Comparing the years 1990, 1995 and 2008, Brazil's GDP (current US\$) improved from 461.95 billion to 768.95 billion and finally to 1.58 trillion. As far as Brazil's inflation rate in the same years, the rate in 1990 of 2,735% diminishes to 94% in 1995 and to 6% in 2008.

While it is true that Brazil's economy has been flourishing in recent years, this does not mean that the country's dark economic past cannot be ignored completely. The newly achieved economic stability of Brazil is a condition rarely seen in the history of Latin America, a history wracked by waves of economic crises, soaring inflation rates and the accumulation of insurmountable debts. Furthermore, the region is intrinsically linked and, therefore, the downfall of one of the countries does not bode well for the rest of the region. A perfect example of this linkage in the region is seen in Mexico's 1982 default on its debt payments to finance the debt it had accumulated after the oil shocks of the 1970's. This default on the part of Mexico caused mistrust by foreigners of the entire Latin American region, and, subsequently, credit started to disappear. This disappearance of credit led to the Latin American nations accumulating even more massive debts, which in turn caused inflation, capital flights and budget deficits. Mexico's default caused Brazil's debt to increase dramatically from \$12 billion in 1973 to \$70 billion in 1982. Also during this time, Brazil suffered from continually soaring inflation rates and low levels of economic growth. While the country's economy slowly improved during the subsequent years, the recovery process for Brazil's economy has been long and arduous. Even in the period between 1990 and 1995, Brazil's inflation rate still averaged an estimated 764% per year.

Therefore, even with Brazil's current commendable state of its economy, the country is so closely intertwined with the other countries of Latin America that the permanence of this economic condition is not entirely certain. Although Brazil made a miraculous recovery from the world economic crisis in 2008, it is not clear whether Brazil would be able to make a similar recovery if the crisis were to have started closer to home in Latin America. Furthermore, Brazil has three questionable characteristics of its economic policy, which could serve to be obstacles for its economy in the future, "...its suspicion of free markets; its faith in the wisdom of government intervention in business and finance; and persistently high interest rates."

Although there is compensation for Brazil through the development of CDM projects, this does not mean that the country does not incur costs through their implementation. In order to curb something like deforestation, Brazil's major environmental problem, the country would need a significant amount of capital in order to be successful, capital that even the thriving Brazilian economy may not possess. For this reason, the Brazilian government would most likely require assistance from foreign nations in the form of financing in order to be able to give financial incentive to ranchers, loggers and others to halt this deforestation. Brazil has already initiated programs like A Reserva Juma and O Programa Bolsa Floresta no Amazonas that pay Brazilians not to cut down trees, but these measures have not been sufficient to reduce the still significant amount of deforestation occurring within the country. The country has even conceded that it lacks the necessary means to be successful in reducing its rate of deforestation. Brazil has pledged to cut deforestation rates by about 70% in the coming ten years, but with the stipulation that it must receive appropriate compensation to do so. Brazil needs assistance from outside nations and may not be able to achieve meaningful changes in its environmental policies without such assistance; "Developing economies may be technically able to make the sorts of near-term emissions cuts the world needs, but they are not going to pursue them effectively unless they get the right assistance from the world's wealthier nations."

Another area in which Brazil may lack the resources necessary in order to change its environmental behavior is in terms of its legislation; “Significant institutional gaps, especially between legislative power and law enforcing authorities, makes enforcing environmental laws in the Amazon region very difficult.” Brazil’s specific environmental legislation can be broken down into two distinct periods: before and after the year 1981. The main distinction between these two periods is based on what exactly constituted pollution. In the time before 1981,

...pollution generally stood for industrial emissions that did not conform to the standards established by law and technical guidelines. At that time, based on the assumption that every production activity caused an impact on the environment, pollutant emissions were fully tolerated, provided that they were kept within preset limits.

While seemingly sufficient prior to 1981, this definition of pollution proved to be too narrow starting in 1981. In the second phase of Brazil’s environmental legislation, pollution was more generally considered anything that has caused damage to the atmosphere, even if created in compliance with emission allowances. Environmental legislation was also dedicated a whole chapter in the Federal Constitution in October of 1988. Within this chapter, thirty-seven articles were presented that dealt with environmental law:

The constitutions conferred a series of duties on the public authorities, including: (i) preservation and recovery of species and ecosystems; (ii) preservation of the variety and integrity of genetic heritage, and supervision of entities engaged in genetic research and manipulation; (iii) environmental education at all educational levels, and development of public awareness about the need to preserve the environment; (iv) definition of the territorial areas eligible for special protection; and (v) compulsory environmental impact assessment for the setup of any activities that may translate into significant ecologic

degradation.

In addition to dedicating a whole chapter in the Federal Constitution to environmental laws, numerous federal agencies were also created in the post-1981 period to enforce environmental legislation. These agencies are all part of the Brazilian Environmental System, SISNAMA, which includes agencies such as: the Brazilian Environmental Council, CONAMA; the Ministry of the Environment; and the Brazilian Institute for the Environment and Renewable Natural Resources, IBAMA.

Although there has been seemingly significant development of environmental legislation, especially with the 1988 Constitution, the effects of this legislation have not been as grand as they may seem on paper. In a study conducted by Prates and Serra entitled, “O impacto dos gastos do governo federal no desmatamento no Estado do Pará,” the authors argue that many of the principal factors causing deforestation can be attributed directly or indirectly to the Brazilian federal government. The authors focus on the state of Pará in their study and analyze the exact effect of government spending on deforestation. What they conclude is that government spending on rural credit and transportation contributes to deforestation, while federal spending on environmental management helps the deforestation problem. According to the argument of Prates and Serra, the Brazilian federal government both mitigates and causes deforestation in the Amazon; “the government’s political expenses have opposite functions and, therefore, nullify each other. In summary, the government has expenses that affect deforestation in the determined region and, at the same time, has other expenses that mitigate deforestation” The authors further point out that the Brazilian government frequently values the benefits that come from deforestation over the costs from the loss of the Amazon. In Fearnside’s paper “Deforestation in Brazilian Amazonia: History, Rates, and Consequences,” he stresses the urgency for the Brazilian federal government to develop environmental legislation that is more than just a “symbolic base.”

While Brazil has shown improvement in both its economy and environmental legislation, it does seem that the country lacks the economic, political and environmental resources necessary to foster successful environmental change like that hoped for under the Kyoto Protocol and the CDM.

Lack of Will

To restate our second hypothesis, I am interested in investigating the claim that Brazil is not committed to its environmental performance at all, disregarding the availability, or unavailability, of resources to make such changes in its policies possible. One sees the bulk of evidence supporting this claim in Brazil's focus on economic gain, rather than on bettering the environment. For example, looking specifically at the Amazon, Brazil's neglect of the world's largest rainforest that is home to some of the most vibrant biodiversity is often attributed to the country's desire for development over sustainability;

In broader terms, the basic arguments of Brazilian officials (against saving the Amazon) involve matters related to development – the economic importance of the timber industry for the region as the second source of income tax for the Amazonian states, and also providing one hundred thousand jobs.

Cattle herding and logging are major sources of revenue in Brazil, and both industries can potentially involve deforestation. In the case of the logging industry, it is obvious why deforestation is involved. In the cattle herding industry, in order for the industry to expand, free land must be found, or created. One of the principal ways that this industry has facilitated its own growth is through the expansion of its frontier onto the land occupied by the Amazon, which includes the cutting down of trees. While this expansion of both the cattle herding and logging industries has included the destruction of the Amazon, many believe that the Brazilian government turns a blind eye to such devastation because

of the major role that cattle herding and logging play in the strong growth of the Brazilian economy. Furthermore, it seems that with specific respect to deforestation in the Amazon, Brazil's government simply lacks the will to change; "The fundamental element to reduce the velocity of deforestation and to one day stop it completely is the political will to do so... Above all, the leaders of the country (Brazil) have to have the confidence that government action really will slow down, or even stop, deforestation."

With its lack of motive to change its behavior in the Amazon, the Brazilian government is failing to realize the importance that the Amazon plays not only in Brazil, but also in the rest of the world;

The Amazon's global importance is well established. It acts as a climate regulator, directly affecting rainfall patterns in Brazil and Argentina. Its winds, recent studies say, may even affect rainfall in Europe and North America. The burning and decomposition of trees cut down for development makes Brazil's chunk of the Amazon responsible for about half of the world's annual greenhouse-gas emissions from deforestation, says Meg Symington, Amazon director for the World Wildlife Fund in the United States.

Brazil's disrespect for the Amazon is having dire effects on the atmospheric makeup of the world. This has led to a tarnishing of the Lula administration's reputation in the eyes of the international community, as the Amazon is a resource valued by much of the world. In response to critics of Brazil's treatment of the Amazon, Lula's administration has responded with the common developing country argument in climate change negotiations that it is not his country's responsibility to help combat a problem that the industrialized countries are responsible for creating. In a speech in 2005 that makes environmentalists shudder, Lula further argues that the Amazon cannot be a resource left untapped; "...it can't be treated like was something from another world, untouchable, in which the people don't have the right to the benefits." While it may be that outside help, possibly in the form

of financial aid or more stringent legal measures, may be necessary in order to push the Brazilian government to curb its deforestation, many theorists suggest that these measures may not even be enough. They may, "...slow deforestation, (but) they will not solve the problem; there is still too great an economic incentive for people to continue clearing forests and for the government to continue allowing it."

Besides Brazil's ineptitude at diminishing its rate of deforestation, possibly due to its valuing of economic development over environmental performance, Brazil has also exemplified its lack of commitment towards improving the environment, in general, in its treatment of ex-environmental minister Marina Silva. Marina Silva was born in the Amazon state of Acre and, therefore, had a personal connection to the Amazon. President Lula appointed her environmental minister in his cabinet in January of 2003. Prior to becoming minister, however, Silva had thoroughly proven her track record both within and outside of the environmental world. Many looked to her as being the potential savior of the Amazon when she assumed her role as environmental minister.

During her time as minister, Silva's main achievement was the development of the Plano Amazônia Sustentável (PAS), or the Sustainable Plan for the Amazon. The PAS was an initiative by the Brazilian Federal Government calling for cooperation among the states of Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Rondônia, Roraima and Tocantins. The objective of the plan was to outline a schedule for sustainable development of the Amazon. Due to her major involvement in the development of the plan, Silva expected to be designated the coordinator, or "o coordenador do Conselho Gestor do PAS" of the PAS. To her and most of Brazil's surprise, President Lula named Mangabeira Unger the coordinator of the PAS on May 8th, 2008. In reaction to this designation of Unger over herself as the coordinator, Silva resigned from her position as environmental minister five days after his appointment.

Although there has been much speculation as to why Silva was not chosen by Lula to be the coordinator, one of the major explanations is that Lula had been pressured by

the more business-minded people of the government not to encourage someone like Silva whose sole objective was to save the environment, and did not truly consider the larger picture of economic development;

Silva's resignation is the story of a conflict between two very different Brazil's. In one corner are the farmers, businessmen and ordinary Brazilians who see the country's vast natural resources as a sure route to economic success. In the other are the environmental activists, indigenous groups and concerned spectators who believe that Brazil's march to economic greatness will mean the continued devastation of its rainforest and its people.

In her letter of resignation to Lula, Silva even cites the resistance she felt from those in Lula's administration who were more business lobbyists as part of the reason for her resignation;

In her resignation letter to the president of the Worker's party, Silva said her decision was an attempt to break with the idea of 'development based on material growth at any cost, with huge gains for a few and perverse result for the majority' including 'the destruction of natural resources.' She added that 'political conditions' had meant that 'environmental concerns had not been able to take route at the heart of the government.'

In the beginning of her time as environmental minister, Lula had supported Silva's efforts for bettering the environment. But once his support dwindled, she had no political backer within the administration and she, inevitably, was virtually forced to resign. Silva's resignation marked a win economically and a loss environmentally.

As if Brazil's reputation in the international arena had not been tarnished enough by its deforestation of the Amazon, the resignation of Marina Silva also did not bode well for Brazil's standing in the world, especially in the environmental world; "Marina takes

all of Lula's environmental credibility with her, credibility which she has brought to his government over the last five years. Without her, King Lula is completely naked." Without Marina Silva as environmental minister, many argue that Brazil's reputation with respect to the environment was a complete sham. Around the time of Silva's resignation, there were two other resignations of key officials within the Environmental Department of Lula's administration. One of the resignations was Bazileu Margarido, President of the Environmental Agency.

Marina Silva was replaced by current environmental minister Carlos Minc. There are not high hopes for Silva's successor, specifically with regard to his addressing of the situation in the Amazon. The current environmental minister uses the bureaucracy of Lula's administration as an excuse for his lack of clear progress towards the protection of the Amazon. This is a stark change, as Silva used to try to work around the bureaucracy to fight for the issues she believed in. While this may have been one of the main contributors to her "forced" resignation, the fire Marina showed during her time as the environmental minister is something that Minc will never have.

The Brazilian government's treatment of Marina Silva and its favoring of furthering the economy over developing sustainable environmental behavior suggest that Brazil lacks the will to truly modify its environmental behavior in a way consistent with the overarching goals of the Kyoto Protocol.

Problems with the Kyoto Protocol

Our final hypothesis explores the idea that Brazil's lack of progress with regard to the environment may not be grounded solely in shortcomings of Brazil, but instead in failings of the Kyoto Protocol itself. This hypothesis points at two potential problems with the protocol. First, the Kyoto Protocol includes project types that are not addressing country-specific environmental problems. And second, it does not give enough incentive for developing countries to change their environmental behavior.

The Kyoto Protocol's first potential problem is that it does not include projects that deal with the specific environmental problems within the developing countries being targeted under the CDM scheme. It does not seem that the Kyoto Protocol and the CDM projects in particular take into account the fact that not all countries' environmental problems lie in the energy sector, as they do not focus on methodologies to help combat these atypical environmental profiles; "Kyoto's approach has not obviously paid off. Global carbon-dioxide emissions have grown by 25% since the protocol was adopted in 1997. That is partly because the treaty left out big emissions sources such as deforestation." Theorists like Santilli et al. have argued that the Kyoto Protocol is almost contradicting its principal mission by not targeting the extreme deforestation existent in various developing countries;

The current annual rates of tropical deforestation from Brazil and Indonesia alone would equal four-fifths of the emissions reductions gained by implementing the Kyoto Protocol in its first commitment period, jeopardizing the goal of Protocol to avoid 'dangerous anthropogenic interference' with the climate system.

One cannot deny that without the implementation of CDM projects in Brazil, the country's emissions would be even higher than they currently are, but this does not justify Brazil's continual reliance on mechanisms such as deforestation going unchecked.

Instead of focusing on the true environmental issues at hand within developing countries, the Kyoto Protocol has instead focused on more easily implemented technologies like hydroelectricity. According to the U.S. Geologic Survey (USGS) power deriving from hydroelectricity is one of the most valuable and commonly used sources of renewable energy in the world, and Brazil is the third largest producer of it. The USGS also outlines the main advantages of hydropower as follows:

Fuel is not burned so there is minimal pollution; water to run the power plant

is provided free by nature; hydropower plays a major role in reducing greenhouse gas emissions; relatively low operations and maintenance costs; the technology is reliable and proven over time; it's renewable – rainfall renews the water in reservoir, so that fuel is almost always there.

Furthermore, hydropower seems to have a relatively fast return on investment, which is not always the case with some other renewable technologies. This makes it a more attractive technology to implement especially for developing countries that do not usually have the luxury of waiting years to see the return on their investments. While hydropower energy does seem like a very attractive alternative to other “dirtier” forms of energy like coal and oil, there are a number of disadvantages, as have already been discussed, like displacement of inhabitants and destruction of natural habitats. The USGS also points to other potential disadvantages of hydropower such as: “high investment costs; hydrology dependent (precipitation); inundation of land and wildlife habitat; loss or modification of fish habitat; changes in reservoir and stream water quality; and fish entrainment or passage restriction.”

Brazil is a country that does exhibit this “atypical” environmental profile, as its energy sector, due to initiatives like its production of biofuel, is for the most part pretty clean. However, the country does suffer from seemingly uncontrolled deforestation, a point discussed in depth throughout this thesis. This is in large part a problem that Brazil has created for itself, but also the Kyoto Protocol is not designed in a way that facilitates dealing with such problems like deforestation, which is the largest contributor to Brazil’s emissions. As I have mentioned previously, avoidance of deforestation was not even included as an approved CDM mechanism for the first commitment period of the Kyoto Protocol lasting until the year 2012. This lack of inclusion was a decision that was made with the knowledge that deforestation avoidance being an approved CDM mechanism would have greatly helped countries like Brazil. While the Kyoto Protocol does not address the deforestation

problem for developing countries, the problem is addressed for those participant Annex I countries. In Article 3.3, the terms for this approach towards deforestation for these countries are outlined;

3. The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under the Article of each Party included in Annex I.

Deforestation is also an accepted methodology under the Emissions Trading mechanism for Annex I and Annex B countries, but not for developing countries that have not legally pledged to reduce their emissions. Theorists like Fearnside have argued that Brazil would even benefit greatly from accepting an emission reduction target; “Although not currently favored by Brazil’s Ministry of External Affairs, the country always has the option of accepting national limits on emissions that would allow it to earn much more by emissions trading...”

In an attempt to justify the lack of focus on environmental problems such as deforestation in the Kyoto Protocol, many argue that the monitoring involved in initiatives to diminish deforestation would be too involved a process to be successful; “Schemes to avoid such deforestation were left out of the Kyoto treaty because it was thought, correctly, that it would be too hard to monitor them precisely.” It seems that to address the dire problem of deforestation from which Brazil is suffering will require much more vigorous initiatives than the CDM was willing to address. Although addressing deforestation in developing countries would not be a simple task, the hopes going into the Kyoto Protocol had been that the international community would be the perfect candidates to attempt to conquer such a problem.

Fortunately, there have been subsequent efforts on the international front to develop some kind of legislation to address the deforestation issue that was not confronted under the Kyoto Protocol. One of the most promising initiatives is the UNFCCC's Reduced Emissions From Avoided Deforestation and Degradation (REDD) scheme that would target deforestation and forest degradation in developing countries. The idea, still in the planning stages, would be to give financial incentive to developing nations to avoid this misuse of land. Contrary to the structure of the Kyoto Protocol, the REDD would give credit to entire nations for progress instead of to individual projects within the countries. As to be expected, there are a lot of unresolved issues surrounding this initiative at its inception, "...including issues such as the deforestation baseline to be used, the role of developing countries that have a low recent rate of deforestation, and the protocols for measurement and validation of emissions reductions." Despite these issues, the UNFCCC in partnership with the World Bank has started preparations for the eventual implementation of the REDD mechanism in 2012; "Thirty-seven countries have applied and already been approved to participate in the World Bank's Forest Carbon Partnership Facility (FCPF) for support to prepare for a future REDD Mechanism." Brazil has also been targeted as a priority country for this REDD Mechanism.

Addressing the second potential problem with the Kyoto Protocol, very much associated with the first, that there is not enough incentive given to developing countries to curb their emissions, I can see that this is reflected in Brazil's carbon dioxide emissions continuing to increase, especially because of the country's deforestation problem increasingly becoming out of hand. Even though the Kyoto Protocol did not deal with deforestation problems in developing countries, the creation of the Certified Emission Reductions being awarded under the CDM was an attempt to add incentive for developing countries, and for industrialized countries and private companies, to implement renewable and carbon reduction projects within these countries. While the CER program did lead to the creation of new projects in these developing countries, the majority of project developers opted for

projects that were easier to implement and cheaper, rather than promoting technologies like reforestation, which could not have reversed the effects of deforestation, but at least could have helped rebuild deforested plots of land.

Focusing on the projects chosen in Brazil specifically, the majority of the projects implemented in the country utilize technologies that are more easily registered like methane avoidance and hydroelectricity, rather than technologies like reforestation. Although the process of registration for any project is long and arduous, projects using reforestation or afforestation (the planting of trees on new plots of land) have an even tougher time getting registered. The CDM Executive Board divides CDM projects into three groups: Large-scale CDM Projects, Afforestation and Reforestation CDM Projects and Small-scale CDM Projects. Each type of project includes different processes for validation. Large-scale and small-scale projects have almost identical processes, as usually they are implementing the same type of technology, differing only in the scale of the project. Afforestation and reforestation projects, contrastingly, have a completely different process, as these types of projects involve highly specific technology. Furthermore, one can see the added work in the validation process for afforestation and reforestation projects when comparing the number of steps involved in the process. For both large-scale and small-scale CDM projects, there are 10 steps involved, while there are 14 steps involved in afforestation and reforestation projects. Given the more intensive validation process involved in projects utilizing reforestation and afforestation, it is no wonder that only 0.53% of all of the registered CDM projects in the world are projects utilizing such technology, and 0% of these projects are in Latin America.

The numbers definitely provide clear evidence that the CDM mechanism does not provide sufficient incentive for countries like Brazil to implement technologies like reforestation and afforestation that could make an attempt at counteracting the deforestation rates; “Slowing deforestation in Brazil’s Amazon will not work through marginal incentives such as the CDM.” Furthermore, because developing countries are not direct participants in the Kyoto Protocol, they are not held to legally binding targets, as the industrialized

countries involved in the protocol are. If developing countries like Brazil had been more actively involved and been given binding targets, one would expect to see that Brazil's deforestation would have been forcibly checked and diminished and, potentially, that afforestation and reforestation would have been implemented technologies to right the damage that had already occurred in forests like the Amazon.

It is unfortunate that the Kyoto Protocol was unable to provide incentive to countries with such high rates of deforestation like Brazil, as there had been many theorized schemes as to how such incentive could have been achieved. In Santilli et al.'s paper "Tropical Deforestation and the Kyoto Protocol," the authors suggest the creation of a concept they call "compensated reduction." The authors claim that this method would be, "...a means of both reducing the substantial emissions of carbon from deforestation and facilitating significant developing country participation in the Kyoto Protocol framework." Santilli et al. envisioned developing countries voluntarily reducing their rates of deforestation below a well-established baseline and receiving credits similar to CER's issued under the CDM for their progress. Although the authors had hoped for the implementation of such a program during the first commitment period of the Kyoto Protocol, fortunately, the REDD program of the UNFCCC is of a similar nature and may help alleviate the deforestation problem in the near future

These two faults of the Kyoto Protocol were acknowledged by the international community, which, in reaction, attempted to correct them at the Copenhagen Conference in December of 2009. Going into the Copenhagen Conference, the hopes were that the resultant accord would include legally binding targets for industrialized countries and suggested, but not legally binding, targets for developing countries. This would have been a step forward from the Kyoto Protocol, but still not the ideal of legally binding targets for all countries. Unfortunately, the Copenhagen Conference failed to live up to these aspirations and, furthermore, even to live up to the precedent that the Kyoto Protocol had set. The results of the Copenhagen Conference were a disgrace to the international

community. The bureaucracy of the conference led to next to nothing being accomplished. No real agreement was made. No emission reduction targets were created. The only significant success that came out of Copenhagen, especially with respect to countries facing deforestation problems like Brazil, is that a nearly unanimous consensus was reached that the UNFCCC's REDD mechanism is the correct path to combating deforestation and forest degradation in the future.

Instead, the conference merely achieved the agreement that the international community, or at least those nations involved in the conference, would not let the world's overall temperature rise by more than two degrees Celsius. There was no indication of how this target would be met and who would be responsible for reducing what, but merely the agreement that the world as a whole did not want to see this increase in atmospheric temperature. Many attribute the insufficient progress seen at Copenhagen to the inefficiencies of international agreements, especially when the large number of actors involved in the agreements is itself an obstacle. In an interview with the United Kingdom's Guardian, Prime Minister Brown calls for the creation of an international body with the sole duty of handling environmental negotiations. He argues that the world must learn from the mistakes of Copenhagen and other failed international negotiations and realize that traditional ways of dealing with international issues must either be discarded or improved if progress is to be made on issues such as climate change in the future.

Conclusion

The Kyoto Protocol has no doubt made history by representing the world's first legally binding international response to climate change. Although focusing on modifying the environmental behavior of industrialized countries, the Kyoto Protocol has also had positive effects on the environmental behavior of developing countries. The main initiative under the Kyoto Protocol to involve developing countries is through CDM projects. While the intrinsic goal of these projects is to reduce emissions, the CDM projects also have the

larger goal of developing sustainable environmental behavior within developing countries.

While CDM projects in Brazil have undoubtedly helped improve the country's energy matrix, especially shown in the country's diminishing growth rate of emissions, Brazil's key environmental problems have scarcely improved with the implementation of these CDM projects. As has been mentioned, Brazil possesses an atypical environmental profile. While the environmental problems for most of the countries in the world lie in their energy sectors, Brazil has a surprisingly clean energy sector. The main environmental problem from which Brazil suffers is deforestation. Unfortunately, besides showing some progress when environmental minister Marina Silva was in power, the Brazilian government has been, for the most part, ineffective at dealing with its deforestation problem. Although the deforestation in Brazil has caused huge international criticism, particularly due to the fact that the Brazilian Amazon is one of the major regulators of the world's temperature, one does not see the Kyoto Protocol, supposedly an international reaction to the world's climate change problems, as effective in ameliorating the situation.

In examining Brazil's environmental situation, I have proposed three potential hypotheses to explain the failure of Brazil to show more progress in dealing with its true environmental problems. The first two hypotheses address potential inadequacies on the part of Brazil, specifically a lack of resources and a lack of will to change its environmental behavior, which could account for the disappointing environmental performance of the country. The third hypothesis moves away from putting fault on Brazil and instead suggests that the Kyoto Protocol and the Clean Development Mechanism projects are designed in a way that does not foster the addressing of the specific environmental problems faced by Brazil and that does not provide adequate incentive to the developing countries, like Brazil, to modify or to even care about their environmental policies.

When examining the hypothesis dealing with a lack of resources, I show that resources, especially capital, are needed in order to attain environmental development. Although Brazil has been experiencing astounding economic growth in the past couple

of years, the capital available for environmental purposes is not directly correlated with this economic growth. Countries, especially developing ones, often do not feel able to use capital to invest in expensive technologies, like renewable technologies, especially when the pay-back period for such investments would be in the long-term; short-term, measurable returns on investment are limited. Furthermore, in order for countries to modify their environmental behavior, they need to have supportive political resources as well. Brazil's environmental legislation is developing, but not nearly to the point necessary to promote the changes in environmental policy necessary to address the country's true problems. For all of these reasons, it is evident that a lack of resources is inhibiting Brazil's ability to address its environmental problems.

While lacking the necessary resources to modify its environmental behavior, I argue that Brazil also lacks the will to change its environmental behavior. This is particularly clear with the practically forced resignation of environmental minister Marina Silva and the economic focus of the government. Silva is internationally renowned for her dedication to the environment and for her authorship of many fundamental pieces of environmental legislation, especially those dealing with the Amazon. Although strong in her knowledge about the environment and in her innovative ideas, Silva was unfortunately too weak politically to remain in power. Had Silva stayed in power, one would have hoped that she would have been able to encourage the Lula government to take more proactive action in the Amazon. This being said, however, as one of the main reasons for her resignation was the resistance she felt within Lula's administration, I am not confident that had Silva remained environmental minister she would have been able to combat the strong lack of desire on the part of the majority of the administration to address environmental issues.

Within the Brazilian government and the country as a whole, there existed and exists to this day a strong push to promote the economy over the environment and a belief that improving the environment is not in the country's self-interest when compared to advancing the economy. The economy and the environment are often at odds in Brazil, as some of

the most economically advantageous industries in the country often function at the expense of the environment. Although it is hoped that Brazil will soon realize the importance of mitigating climate change through measures like curbing its deforestation, the country currently seems to lack the drive to make such necessary changes to its environmental behavior.

My final hypothesis for Brazil's failure to truly modify its environmental policy finds the Kyoto Protocol and the CDM projects also to be at fault. The Kyoto Protocol does not have measures that address situations of deforestation and instead focuses on addressing energy sector environmental problems. Although the CDM projects focusing on the energy sector have, for the most part, helped to improve Brazil's already clean energy sector, the principal environmental problems that Brazil faces do not lie in its energy sector and instead are problems of LULUCF (Land Use, Land Use Change and Forestry). Besides not addressing the exact problems faced by Brazil, the Kyoto Protocol also includes the highly criticized renewable technology of hydropower as an approved CDM. Hydropower, although probably better than coal or oil, is extremely destructive to surrounding habitats and causes the displacement of settled communities, among other negatives. Finally, by not including developing countries as direct participants of the treaty, the Kyoto Protocol fails to provide developing countries with strong incentives to change their environmental behavior.

As has been demonstrated in this thesis, there are three main reasons that have contributed to Brazil's mediocre change in its environmental policy, even in the presence of strong international pressure for change and initiatives like the Kyoto Protocol's Clean Development Mechanism. The resultant behavior of Brazil cannot be explained solely by one of these reasons. True environmental change within Brazil cannot be achieved merely by a true will to change, by the necessary resources or by a strong international institution; taken separately, these three reasons are not sufficient to describe the environmental situation seen in Brazil. But taken together, they sufficiently explain why Brazil's progress

with regard to the environment has not been more significant; Brazil's lack of sufficient resources and will to change its environmental behavior coupled with certain failures of the Kyoto Protocol explain Brazil's failure to demonstrate true environmental change to date. While the international community had hoped that the Copenhagen Conference of 2009 would help to deal with the problems seen in the Kyoto Protocol and to involve the more direct participation of developing countries, the conference was an almost complete failure.

The hope for future international negotiations surrounding climate change is that countries will swallow their national pride and self-interests and be able to take those actions required by the international community for successfully addressing climate change. For Brazil, this would mean that the country would actually pledge to deal with its deforestation problem, notwithstanding the shorter-term effect on the country's economic activities. This being said, future negotiations would also have to assist developing countries like Brazil that lack necessary resources to achieve the changes that would be required of them. While the CDM projects represent an attempt to supply financial incentive to implement renewable projects, a future treaty would have to involve even more assistance, especially financial, to these developing countries than that seen in the CDM.

What the Brazilian government and the international community are failing to realize is that climate change is only going to get worse and its effects are, for the most part, irreversible;

'The issue of climate change is one that we ignore at our own peril. There may still be disputes about exactly how much we're contributing to the warming of the earth's atmosphere and how much is naturally occurring, but what we can be scientifically certain of is that our continued use of fossil fuels is pushing us to a point of no return. And unless we free ourselves from a dependence on these fossil fuels and chart a new course on energy...we are condemning future generations to global catastrophe.'

No matter the costs to individual actors, the international community must come

together and find a way to negotiate effectively a containment strategy for global warming. For each day without an effective plan, the problem of climate change will continue to worsen.

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