COMPARATIVE ANALYSIS OF THE CLIMATE CHANGE AND ENVIRONMENTAL POLICIES IN BRAZIL
Challenges, Risks and Opportunities for the Amazon Region

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Comparative Analysis of the Climate Change and Environmental Policies in Brazil

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This report was designed for Global Canopy Programme
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2009
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ACKNOWLEDGEMENTS

Many people contributed to the preparation of this paper. Thanks also go to many academic colleagues, scientists, economists and comparatists. We would like to thank particularly Global Canopy Programme staff, Silvia Miranda (USP-ESALQ), Ligiana Damiano (USP-ESALQ-Library), Ignacio Poveda (Director USP/FDRP), Agência de Água PCJ staff, Prince Charles Foundation, Multi-Donor Trust Fund Office United Nations Development Group and the Bodleian Library Staff - University of Oxford (UK).
PREFACE

We write this text on the eve of the start of the Copenhagen Climate Summit (COP-15) meeting and we make no effort to hide our expectations about the possibility of advancing on a series of as of yet undefined issues during this global meeting.

The aim of this study is not an exhaustive analysis of the legal context for PES in Brazil, but rather it is to assess the most relevant elements that will give shape to the Brazilian scenario, which is still being constructed and which potentially has the most marked federal and state policies that are able to effectively participate in the attainment of sustainable development in Brazil. We are sure that this paper draws a picture of the most relevant and new initiatives in public policies and regulatory frameworks in Brazil, especially in the states forming an arch of deforestation in the Legal Amazon, at a moment when great political decisions must be made and significant transformations, which are so necessary, are in the gestational phase, in order to advance the results of ongoing public policies and new bills under discussion in congress.

Thus, we hope that this portrait of Brazil will soon undergo significant growth.

Gisele Ferreira de Araújo  Alexandre Betinardi Strapasson
ACRONYMS

AR Afforestation and reforestation
APP’s Permanent Preservation Areas
CENAFLOR Centre for Forestry Training and Capacity Building (Centro Nacional de Apoio ao Manejo Florestal)
CER Carbon-Emission Reduction
ICER Long-term Carbon-Emission Reduction
tCER Temporary Carbon-Emission Reduction
CoP Conference of the Parties
CDM Clean Development Mechanism
CR Compensated Reductions
EMC Environmental Monitoring and Control
ES Environmental Service
FAO Food and Agriculture Organization of the United Nations
FCPF Forest Carbon Partnership Facility (World Bank)
FNO Fundo Constitucional do Norte (North Constitutional Fund)
GHG Greenhouse Gas
GIFC Global Initiative on Forests and Climate (Australia)
INCRA National Institute for Colonisation and Land Reform (Instituto Nacional e Colonização e Reforma Agrária)
IPCC Intergovernmental Panel on Climate Change
JI Joint Implementation
JRC European Commission Joint Research Centre
LUCF Land-Use Change and Forestry
LULUCF Land Use, Land-Use Change and Forestry
PAS Sustainable Amazon Plan (Plano Amazônia Sustentável)
PES Payment for Environmental Services
PNMC National Plan on Climate Change (Plano Nacional de Mudança Climática)
PRONAF National Programme of Fomenting Familiar Agriculture (Programa Nacional de Fortalecimento da Agricultura Familiar)
REDD Reduced Emissions from Deforestation and Degradation
UNDP United Nations Development Programme
UNEP United Nations Environment Programme
UNFCCC United Nations Framework Convention on Climate Change
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ABSTRACT

The present study is aimed at addressing the current situation for Payment for Environmental Services seen from the view of Sustainable Development and Land Use Change in Brazil. This study shows a scenario that was updated up to November 2009 concerning the key environmental public policies, instruments of environmental management, legal frameworks, and new regulatory frameworks applicable to the states in the arch of deforestation. It also highlights the lessons learned in programs that have been perfected in Brazil’s most developed states. The predominance of national and state programs and the situation of decentralization in relation to the municipalities shows that the Brazilian scenario is still under construction and that there is a long way to go, especially when focusing on the states in the arch of deforestation which, on the one hand, present pioneering initiatives, and on the other, are out of pace regarding socio-environmental public policies, creation of legislation and mechanisms of coercion, showing the need for synergetic and integrated management in order to face the challenges set forth by climate change and deforestation.
1. INTRODUCTION

The growing concern with global warming and the sense of urgency from climate change has placed scientific research and international debates on the topic of deforestation and of new approaches to environmental management on the agenda. Costa Rica was one of the first countries to implement Payment for Environmental Services schemes aimed at forestry conservation and in Brazil the first steps taken in this direction were the Proambiente (Pro-environment) programs and Bolsa Floresta (Forest Stewardship Program) program in the state of Amazonas.

Brazil's environmental policy has been generally supported on command and control instruments and despite strict environmental laws, deforestation, influenced by the hike in the prices for commodities on the international market and by the growing demand for products from agriculture and livestock, has reached extremely high levels, in a trend that will be difficult to reverse using the public policy instruments that are currently available.

Considering the size of the forest areas, the difficulty in accessing many Amazonian regions, and the fact that many farmers are unable to comply with the law without directly compromising their well-being, it is insufficient and unviable to maintain an environmental policy based solely on control and oversight due to the high costs of the implementations demanded.

The issue must be considered according to the ecological, economic, social, legal and political view, with the legal dimension being strengthened and gaining more clear and specific boundaries.

In this context, the PES proposal has two very important innovations regarding conservation policy and sustainable use of the Amazon rainforest, specifically the great potential for self-regulation, taken into account the difficulty faced by agents in Brazil to monitor the forest, and the ability to create and increase the income of environmental service providers, considering the costs of opportunity.

We can find statements in legal codes and in state and federal legislation. We must analyze the existing legal and political infrastructure as well as what the new instruments are that will give us a new legal and political framework that will be able to strengthen the mechanisms to protect environmental services and natural resources. We must protect what we have and we must not just regret the things we no longer have.

This paper will clarify the PES concept for conservation stakeholders, insofar as its potential is concerned and will lead to a better understanding of the most important promise of innovation concerning conservation since Rio 1992.

The aim of this paper is to review the existing legal framework and public policies of the main Brazilian states in the region located in the so-called “arch
of deforestation” using a comparative view. In other words, it is relevant to analyze the institutions, existing policies and the legal framework of the states of Amazonas, Pará, Rondônia and Mato Grosso. The aim is also to compare the existing legal framework, concentrating on state and federal law and drawing a comparison between them. In relation to environmental services, carbon sequestration, forests, biodiversity and protection of water resources will be examined.

A relevant approach identifies the legal and institutional conditions to develop payment for environmental services schemes and natural resource protection schemes in Brazil.

The paper addresses the following specific questions and concerns regarding Payment for Environmental Services in the specific states of Amazonas, Roraima, Pará, and Mato Grosso: What is the interaction between federal and state law and what are the pros and cons for new regulatory frameworks? What is the Forest Code and what are the current transitions and flexibilities and positive and negative impacts? Another relevant aspect to be considered is what the approach would be for the future and what new methodologies can be developed and effectively applied. What are the boundaries of the current and future policies to support conservation and maintenance of environmental services in the Legal Amazon? What legal and political infrastructures are available for preserving environmental services, natural resources and national capital in the long term.

Based on this, the intent is to outline perspectives for applying PES in the Amazon region, the target of our study, as a complementary measure to current environmental policy, and to identify the essential elements for designing a present and future application.
2. LAND USE CHANGE IN BRAZIL

Zonings are an important planning instrument that has been traditionally used to reduce agricultural risks, for the financial and security sectors, using satellites images and rural surveys. Their objectives are to identify areas with low climate risks for a specific crop, considering available varieties, cultivation periods and soil conditions. Sometimes there are crops with high vocation for a same area, especially in Brazil that has the biggest arable land in the world. In this case, the opportunity cost is a determinant factor which the farmers use to develop their strategies. This climate risk zoning is used not only in Brazil but also in many other countries. However it does not consider some other important environmental concerns.

For example, nowadays Brazil is evaluating to use some climate change downscaling scenarios to gradually improve such zoning. By doing this, it will be possible to use adapted varieties for a new local climate conditions, contributing for the food security and reducing risks for both farmers and banks. Therefore, to advance on agricultural vulnerability studies, by using downscaling models, as well as to domain a broader germoplasma reserve are absolutely key issues on agricultural adaptation for climate change. Embrapa, the Brazilian Agricultural Research Corporation, which is under the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA), is already working on that.

2.1 The Sugarcane AgroEcological Zoning: lessons and challenges

The agroecological zoning considers further variables than the climate risk zoning, taking not only soil and climate aspects, but also the current land use, topography, water resources and environmental protected areas. The first agroecological zoning to be developed was on sugarcane. The full report was published by the Brazilian Government in 2009 (Manzatto et al, 2009) and officialised by the Decree 6.961/2009.1

The aim is to stimulate a sustainable expansion of sugarcane for ethanol and sugar production. Brazil is the biggest world sugar and ethanol producer from sugarcane. In the sugarcane agroecological zoning the following areas were excluded:

- Amazonia and Pantanal biomes;
- Hydrographic Basin of Paraguay River;
- Areas with any type of native vegetation, in any Brazilian biome;
- Areas without soil and climate favourable conditions;
- Areas that requires full irrigation system;
- Declivity more than 12%;
- Protected areas;

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- Indigenous reserves;
- Areas with high conservation value for biodiversity.

This zoning was something pioneering on biofuels, considering all these environmental aspects and in a very large territory, since Brazil is the 5th biggest country in the world. So it represents an important challenge for the sustainable development and a new technical subsidy for the government to draw public policies towards the sustainable expansion of sugarcane, for example: linking financial support just for favourable areas and better return rate for pasture lands occupation. It is a preventive action for a strategic sector, being an additional environmental request.

The target is to promote the sugarcane expansion on explored areas, especially on pasture lands, avoiding food competition. The table 1 shows the Brazilian current land use.

Table 1: The Brazilian land use distribution.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Million hectares</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture</td>
<td>172.3</td>
<td>20.2</td>
</tr>
<tr>
<td>Crops (yearly and perennial), except sugarcane</td>
<td>68.9</td>
<td>8.1</td>
</tr>
<tr>
<td>Sugarcane*</td>
<td>7.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Woods and agricultural forests</td>
<td>99.8</td>
<td>11.7</td>
</tr>
<tr>
<td>Amazon forest, protected areas, cities and others.</td>
<td>502.2</td>
<td>59.0</td>
</tr>
<tr>
<td>Total</td>
<td>851.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: IBGE, Census 2006
* Mapa/Conab, 2008

Pasture land in Brazil has been used in low efficient manner in some areas. Despite the very high efficiency of the cattle production in some regions in Brazil, its north region has an average of less than one animal unit per hectare, which could be improved. Therefore, it is possible to convert some pasture lands for other crops without to reduce the livestock production. By the way it is already occurring in the State of São Paulo, where the sugarcane expansion is occupying part of the pasture land, which is decreasing on area. However the beef and milk productions have been increased in the same State. Currently Brazil is the biggest world beef exporter, but 15 years past it was a beef importer. Thus, the indirect land use change must be discussed considering the reality of each country and each region. For example, the grains production in Brazil has been increased 8.5% a year, but the area just 1.3% a year, representing a productivity gain of 5.4% a year, thanks for better technologies and agricultural management, see figure 1.
The thesis is that the sustainable production of food “and” fuel is possible for some cases, without direct competition. For instance, in Brazil the sugarcane destination is for both food (sugar) and energy (ethanol, electricity, thermal and mechanical energies). The sugarcane juice becomes around 55% ethanol and 45% sugar, being the bagasse used for cogeneration, by combined heat and power systems. The sugarcane uses to be cultivated in a same area up to 5 years, as an average. So, every year, roughly up to 20% of its area is rotated with another crop, usually a leguminous plant, for example: soybean or peanuts, both food crops. Another point is the high energy efficiency of the sugarcane-based ethanol. The ethanol productivity is around 8,000 litres per hectare, but with second generation it could be duplicated. Besides, its production in Brazil requires less than 1% of its territory. The domestic consumption is already higher than gasoline, in a country that uses basically Otto Cycle for light duty vehicles and where there are more than 20 million of such vehicles. However this successful biofuels program started more than 30 years ago, with the Pro-Alcohol Program, launched in 1975, with many gains and mistakes since then.

The figure 2 presents a summary of the potential areas for the sugarcane expansion, respecting the agroecological zoning. The potential favourable areas are 63 million hectares (green spots), which means 11% of the Brazilian territory, but just a small part of that is expected to be occupied by sugarcane.
The agroecological zoning for biofuels production can be an important tool for the sustainable territory planning, becoming possible to produce food, fuel and feed, without direct competition and without to pressure the protected areas. But to do so, governmental rules and incentives are basic requirements. The Brazilian experience can be “adopted and adapted” for countries with available areas to produce biofuels, especially some developing countries in Latin-America, Africa and Asia, located in the tropical region, which has, in general, the best natural conditions for bioenergy production.

Considering the three pillars of the sustainability - economic, environment and social - the social concern must also be respected. The ethanol production generates much more jobs than in the gasoline chain. There are around 1.3 million people formally working in the Brazilian sugarcane sector. Despite the manual harvest is an arduous work, around 500 thousand people work as sugarcane cutters in Brazil (Sousa & Macedo, 2009). Thus, the current challenge is to stimulate both best labour practices and the advance of mechanical harvest. An important public policy is the “Social Agreement on Sugarcane”, launched in 2009. It is a legal term that was voluntary signed by worker’s representative and companies’, establishing best work conditions beyond the labour legislation. More than 75% of the Brazilian sugarcane producers have already signed that agreement, which was coordinated by the Federal Government.

Since manual harvest of sugarcane is not a desirable work, the agroecological zoning considers potential areas only those with declivity lower than 12%, where the mechanical harvesters can operate. The Federal Government also recently submitted the Project of Law 6.077/2009 for the Parliament on a phase out period to stop burning sugarcane, enforcing its mechanical harvest. This is

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also a gain for soil conservation. To keep the sugarcane straws on the soil increases its carbon amount, reducing erosion and the demand for herbicides. Sugarcane burning also damages the air quality, especially by NOx, SOx, CO and aromatic compounds, particulate materials and hydrocarbons emissions (Strapasson & Job, 2007).

In a near future it would be profitable to bring part of its straws amount to the industry for energy generation, but the transportation costs are still a challenge for that. Another possibility would be to produce ethanol with the straws and the bagasse, by the lingocellulosic hydrolysis technology or by the Fischer-Tropsch process, besides energy generation. In such near future, other crops can also be interesting for energy production, such as: sweet sorghum, switch grass, Pennisetum sp. and eucalyptus. There are also technologies under development to use biomass, especially sugarcane, to produce diesel, gasoline, kerosene, chemical compounds and many other bio-products.

Biofuels can be an important alternative for the sustainable development of rural areas, avoiding exodus for the urban areas, by giving job opportunities in the agricultural and industrial stages. In the case of sugarcane production the industry must be located in a distance up to 40km from the cultivated area, because the crescent transportation costs. The sugarcane must also be processed immediately after to be harvested, which means that the raw material cannot be exported to produce sugar and ethanol, but just its industrialized products. It induces the outback development, enhancing the quality and income of small cities. It also represents a baseline for the economic development, reducing the demand for fossil fuels. To give sustainable economic opportunities for rural areas is a key issue to reduce poverty and illegal deforestation.

In fact, besides environmental concerns, nowadays it is not viable to produce ethanol in Amazon Region, because of its long raining season and distance from the consumer market, as well as precarious infrastructure in such region. However, this agroecological zoning is an important precaution instrument to avoid potential future risks for both the biofuels sustainability and Amazon conservation. The same concern is valid for the Pantanal Region.

Biofuels are a competitive renewable energy to substitute part of the oil demand, mainly in the transport and chemical sectors, but they must be considered as part of a whole energy mix, with many other energy alternatives for each purposes and end use. It is just part of the solution for the fossil fuels demand, but it is already a viable and available alternative. The sugarcane-based ethanol can reduce around 70% to 90% the carbon dioxide emissions, compared with the gasoline consumption, in a life cycle analysis (Soares et al., 2009; Macedo et al., 2004).

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The raining equatorial region has the favourable climate for palm production, including Amazon Region. Palm can be a profitable alternative to be developed in explored areas, especially in Amazon pasture lands, since respecting zonings and serious public policy in order to avoid deforestation problems. The Palm Agroecological Zoning is being conducted by Embrapa, together with the Brazilian Ministry of Agriculture, Livestock and Food Supply and Ministry of Science and Technology.

As the sugarcane agroecological zoning, this palm zoning considers just occupied lands as a reference data, which means all the native forest has been excluded on such analysis. Preliminary results, not yet published, show many favourable areas for palm production in the States of Pará, Mato Grosso, Rondônia, Acre and Roraima. The Brazilian Northeast Region also has interesting potentials, especially the States of Pernambuco, Alagoas, Bahia and Espírito Santo, in their humid regions, being also an important alternative to diversify their agricultural production.

The palm oil is a strategic sector for the Amazon Region in order to generate income and jobs for its population, reducing the deforestation. It is the main commercialized oil in the world market share of food oil, even more than soybean oil. The palm tree has a very efficient conversion of solar energy into oil, producing around 5,000 L of oil per hectare. Its oil is basically olein (liquid) and stearin (solid) fractions, with low oxidation level. There is also the palmist oil, which comes from the nut part of the fruit and has even a better value, especially for the cosmetic and pharmaceutical markets.

The free fatty acids, resting at the end of the industrialization process, can be easily converted into biodiesel, without glycerine residues. Biodiesel can be produced with the main palm oil portion too. Brazil has a biodiesel program, which still use basically soybean oil. There is a mandatory blending on 4% of all diesel consumption. Other crops are being studied as competitive crops for oil production, including palm trees, jatropha curcas and sugarcane.

Moreover palm is also a perennial crop with manual harvest. It is usually cultivated with native grass between the palm tree lines, protecting the soil from the erosion. The palm industries use to be self sufficient on energy, using palm residues to generate mechanical, thermal and electrical energies. The industry must be preferentially near the farms, due to the crescent transportation costs and the raw material degradation. Then its industrialization should occur in the same region, representing an economic opportunity for developing countries. In Brazil there are some successful cases producing palm oil in explored areas of the Amazon Region, based on integrated production system, between companies and small farmers. However, Brazil is still a palm oil net importer.

Such Brazilian palm and sugarcane agroecological zonings can also be developed in other countries and for many other crops. Moreover there is also another type of zoning that considers all crops and protected areas as a whole,
in a broader view, which is the “Ecological-Economic Zoning” (ZEE, acronyms in Portuguese).

### 2.2 The Ecological-Economic Zoning (ZEE)

The ZEE aim is to promote a better land use and environmental conservation. The Ministry of Environment is responsible for this coordination in a national level, but it must be implemented autonomously by each Brazilian State. Since the ZEE proposition, in 1988, just some States have already concluded theirs ZEEs. In fact, it requires a long process, depending on policy goodwill, many technical studies, public audiences and State Parliament approvals.

The States of Acre, Rondônia and Roraima have concluded their ZEEs being all located in the Amazon Region. Some other states has being in an advanced position regarding such zoning, for instance: Pará, Rio de Janeiro, Minas Gerais and São Paulo. The State of Pará, which is also located in the Amazon Region, has concluded such ZEE just for its West Region. It is an important step, but the conclusion of its remaining part is absolutely strategic, since this State is facing the major problems of Amazon deforestation arc.

In the Amazon Region is allowed to commercially use just 20% of any land property, in any State of its Region. So, all farmers must respect 80% of their lands for environmental conservation. This is a very polemic issue, since in some areas could be possible to use more than that for agribusiness purposes, reserving near areas for environmental conservation. With the ZEE it is possible to do that. When being formally approved it is allowed to use up to 50% of the land size, rather than 20%, mainly for areas that has been already explored. Then it is possible to improve the land economic efficiency and to avoid the occupation of native areas. By the other hand, for some fragile areas the conservation criteria are much more restricted than that.

In the case of the Legal Amazon, there is also a macro ecological-economic zoning, named the Macro-ZEE project, aiming to contribute for the Sustainable Amazon Plan, establishing policy alignments towards a sustainable development model for such region (MMA, 2009). This macrozoning does not allow reducing the legal reserve to 50% as the ZEE does, but this aim is basically different. It gives a macro perspective of the Amazon Region in order to have better public policies as a whole, without to request the conclusion of all ZEEs in the Amazon States.

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2.3 Challenges on the Amazon Land Use

By sustainable using the explored areas of the Amazon Region it is possible to avoid damaging native areas for agricultural purposes. It is an opportunity-cost challenge, considering there are more than 20 million inhabitants living in the Amazon Region, most of them living in very poor conditions. Those people must be inserted in the Brazilian economy in order to improve their incomes and social development, especially in the outback municipalities. Many international criticisms about the Amazon deforestation try to convince that the Amazon occupation must be avoided, but this region has been already occupied from many years. Therefore sustainable development is the answer.

The Amazon deforestation tax has decreasing in the last years, thanks for the combat and punishment intensification of the illegal wood exploration and charcoal production, as well as the illegal livestock production in public and protected areas. Part of such illegal wood is being consumed not only in the Brazilian market, but also in the European and other markets, including many countries that use to criticize such practice. The figure 3 shows the Amazon deforestation process.

Figure 2: Legal Amazon Deforestation Rate

![Legal Amazon Deforestation Rate (km²/year)](image)

* The 2009 data is an estimated forecast.
Source: INPE (2009).


Regarding the illegal charcoal exploration it could be avoided by cultivating more energy forests, especially in order to supply energy and carbon for the mining and steel industries.
The livestock production in this region uses to be low efficient mainly due the land cheap price. Most of the farmers do not have property rights and also use the cattle to demark their territory. In order to avoid such practice and the livestock production on the deforestation arc, some important Brazilian frigorific companies assigned a reference document in October 2009, named “Zero Deforestation Agreement for the Amazon Livestock Chain”, assuming they will respect some additional social and environmental criteria to buy cattle from the Amazon region.

The Brazilian Government restricted agricultural financing for illegal properties in the Amazon region. The government is also using army, police and satellite technologies to combat the deforestation process. However just to forbid the Amazon deforestation seems to be not sufficient, since another economic alternative must be offer for those populations living there. By the way the European and USA forests almost disappear in the last centuries due such attractive economic exploration and land occupation. But Brazil cannot accept that today, considering biodiversity and global warming concerns.

Even in the explored areas in the Amazon Region, it is quite possible to increase the carbon stocks in the pasture lands, just intensifying its productivity. After an expected stabilization of the land use change in the Amazon Region, the pasture lands should be more efficient and technically intensified. For instance: using the crop-livestock integration systems, the quantity of roots increases rapidly, year by year. Therefore a significant carbon amount could be captured from the atmosphere to the soil by the photosynthesis of grass crops, contributing for the climate change mitigation. On the same way, the agroforestry systems and silvo-pasture practices are also interesting alternatives in terms of carbon capture and agronomical efficiency.

The no-tillage technology for annual crops can also increase the carbon stocks in the soil. There are around 28 million hectares using no-tillage technology in Brazil (FEBRAPDP, 2009), one of the biggest grain producer in the world. ¹ Considering the features of the current Brazilian cultivated land, it is possible to increase that up to 35 million hectares. Then, there is a great potential for climate change mitigation through carbon capture in agriculture.

3. CLIMATE AND FOREST CONSERVATION FRAMEWORK

Forests cover nearly one-third of the earth’s land surface and account for almost half its terrestrial carbon pool. The forests’ destiny is of crucial concern in tackling with climate change. Halting deforestation and forest degradation, and increasing forest and tree cover, could have significant impacts on global greenhouse gas emissions.

Deforestation and forest degradation have direct and indirect causes. The main direct cause is the expansion of agriculture and pastures. Indirect causes include policies, national or international, that may subsidize non-forest land use, poor governance, and high prices for commodities.

In this essay, especially in this topic regarding forest conservation, it is important to bring some key concepts valid when addressing an international scenery. According to the literature, Conservation is considered as the preservation of the functioning and diversity of an ecosystem in its current dynamic state. Although change is an inherent feature of natural systems, the emphasis is on maintaining resistant and resilient systems that contribute to the long-term well being of human societies (Kasperson et al. 1995). In reverse, exploitation is any purposeful activity aimed at generating short-term financial benefit while altering ecosystem composition. The successful implementation of conservation and exploitation activities faces different barriers and opportunities, discussed in this essay regarding forest ecosystems in the Amazon.

Adaptation is the ability of a system to adjust to climate change, to moderate potential damage, to take advantage of opportunities, or to cope with the consequences (IPCC, 2001). Under some climate change scenarios, current levels of adaptive capacity will be insufficient to prevent significant negative impacts on biodiversity and the many goods and services that forests provide. Mitigation as it is defined by IPCC (2007) is seen as the technological change and substitution that reduce resource inputs and emissions per unit of output. Although several social, economic and technological policies would produce an emission reduction, with respect to climate change, mitigation means implementing policies to reduce GHG emissions and enhance sinks.

Not only under an international view, but also valid to a national context, particularly in Brazil that detains the largest forest in the world, it is correct to say that forests can contribute to the mitigation of climate change through carbon sequestration, carbon substitution, and carbon conservation. The extent to which they do so is a function of their management and the effectiveness of policies at the local, national and global levels. Mitigation and adaptation are

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equally important, especially given the potential for climate change to reduce the mitigation ability of forests, and should proceed simultaneously. Mitigation will succeed only if appropriate adaptation measures are in place. Adaptation and mitigation objectives are complementary and policy approaches to address them can be mutually supportive. These lessons are essential to understand that one of the sustainable development and adaptive approaches is Sustainable Forest Management (SFM), which will help to ensure that forest management suffers the correct adjustments in the light of changing conditions.

The UNFF recognizes SFM as “a dynamic and evolving concept that aims to maintain and enhance the economic, social and environmental values of all types of forests for the benefit of present and future generations” (United Nations Economic and Social Council, 2007).

Sustainable Forest Management encompasses the following seven thematic elements (‘criteria’), which have been acknowledged by the UNFF and articulated in various sets of regional criteria and indicators for SFM (FAO, 2006):

a) Extent of forest resources
b) Biological diversity
c) Forest health and vitality
d) Productive functions of forests
e) Protective functions of forests
f) Socioeconomic functions
g) Legal, policy and institutional framework.

These elements are essential to be considered when construing public policies and regulatory marks in national, state and municipal level. As it will be seen in the following lines and tables concerning states of Legal Amazon, it seems that these aspects are treated in an isolated manner both in policies and regulation and the consequences sometimes involve serious conflicts that can make not feasible the sustainable development.

This fact indicates clearly that the triple bottom line standard was not appropriately understood and applied. The relevance of adaptation and mitigation was not given the crucial role they really have in this process. Forestry literature, however, stresses that measures that might assist forest ecosystems to adapt to climate change include the conservation of genetic variation, reduced impact logging, increasing the size and connectedness of buffer zones, and policies that ensure effective management responses to ecological change. Such measures should constitute an integral part of forest-sector strategies to adapt to climate change in both natural and planted forests. Adaptation should be treated as a development issue and part of national development program, even if it is seen as an additional cost and even if it adds

10 Idem note 9.
12 Idem note 9.
complexity to the delivery of other development goals.\textsuperscript{13} Perhaps, it is the most relevant recommendation that could be given in terms of Brazilian experience.

Under a socioeconomic approach, forests house a large part of the world’s biological wealth, perform an important role in the provision of water and other ecosystem services, sustain many Indigenous cultures, and support the livelihoods of hundreds of millions of people.\textsuperscript{14} For this reason, the success of national and state climate plans may depend on the direct participation of these groups, even if they present different interests which may require a harmonized approach.

In Brazil, current national climate change policies provide not enough incentives for reducing deforestation and very limited incentives for reforestation and afforestation, even though the INPE’s most recent report point out to a more positive scenery of emissions reduction due to deforestation reduction rates. According to these figures from 2008, Amazon region contributes to approximately 1.5\% of global emissions.\textsuperscript{15}

Given the potential of afforestation and reforestation in carbon sequestration, CDM procedures should be simplified. Although SFM and CDM provide a suitable framework for addressing such issues within the forest sector, cross-sectoral approaches will also be needed.\textsuperscript{16}

The CDM arose from an analytical framework proposed by Brazil in the Kyoto Protocol negotiations for determining each country’s relative burden based on historical Greenhouse Gas emissions (the Brazilian Proposal). The Brazilian Proposal required countries in the North exceeding their Emissions Caps to pay a penalty into a Clean Development Fund (Clean Development Fund) that would fund Greenhouse Gas emission reduction projects in the South (Miguez, 2005). Through negotiations between Brazil, on behalf of the South, and United States, on behalf of the North, the Clean Development Fund evolved into the CDM (Boyd et al., 2007) (Cole, 2007).\textsuperscript{17}

Land use, land-use change and forestry (LULUCF) account for approximately 25 percent of annual total greenhouse gas (GHG) emissions. The vast majority of LULUCF emissions come from deforestation in developing countries. Although tropical deforestation is a longstanding environmental issue, the climate debate sheds new attention on, and potentially new sources of support for, the value and services rendered by tropical forests. Despite the magnitude of LULUCF emissions, currently no mechanism within the United Nations Framework Convention on Climate Change (UNFCCC) or Kyoto Protocol allows reduced emissions from deforestation and degradation (REDD) to function as a means to achieve emissions targets. Despite consensus that emissions from

\textsuperscript{13} Idem note 9.
\textsuperscript{14} Idem note 9.
\textsuperscript{16} Idem note 9.
LULUCF activities should be addressed immediately, significant disagreement remains about how to achieve this goal.\textsuperscript{18}

Some researchers say the opportunity to incorporate REDD into mainstream market-based mechanisms is growing, although there has not been a comprehensive, systematic analysis of how REDD could be incorporated in national frameworks. In Brazil, there is a trend to create mixed systems for REDD, with public and private financing for reducing deforestation linked by compensatory mechanisms, although all of these mechanisms are not consolidated and the size of the market is not known.

Another aspect associated to the above mentioned trend is the role of the countries’ technical capacity to REDD, mainly in the developing ones. Brazil has an advantage regarding this aspect due to the excellence in technological knowledge, remote sensing, geoprocessing and environmental monitoring carried out by INPE (National Institute for Space Research).

For this reason, one of the most important aspects of COP-15 negotiations is focused on REDD. AR activities are inherently different from REDD activities. AR activities \textit{capture carbon}, and credit generation is based on increases in carbon \textit{stocks}. REDD activities \textit{reduce emissions}. Reducing emissions from deforestation requires reducing the rate of deforestation below some baseline scenario. Note that, emissions from deforestation will continue, and carbon stocks in a forest will decrease, even though credits are generated.\textsuperscript{19}

The UN-REDD Programme is a major initiative among FAO (Food and Agriculture Organization), the UN Development Programme (UNDP) and UNEP (United Nations Environment Programme) to support developing countries in their efforts to combat deforestation and forest degradation. Nine countries were chosen for testing ways of better managing their existing forests in order to maintain ecosystem services, maximize carbon stocks, deliver benefits to the community, and boost livelihoods. Some countries started their REDD efforts by developing national strategies, establishing systems for monitoring, assessment, reporting, verifying forest cover and carbon stocks, and building capabilities.\textsuperscript{20}

It is important to understand the differences between Deforestation and Degradation. Although both terms are often mentioned together, they have unique drivers, they represent different activities and may result in different forest conditions. The process of identifying and avoiding deforestation and degradation can also be quite different.\textsuperscript{21}

The concept of deforestation is defined by the IPCC as the “permanent removal of forest cover and withdrawal of land from forest use, whether deliberately or


\textsuperscript{19} Idem note 18.

\textsuperscript{20} Idem note 9.

\textsuperscript{21} Idem note 18.
Forest degradation occurs when changes in the forest negatively affect its production capacity. Deforestation refers to the entire loss of patches of forest via clearing, whereas degradation refers to the gradual thinning of forests; degradation may result in crown cover changes, but not below the forest threshold. Forest degradation may eventually result in deforestation. Although more subtle than deforestation, degradation results in significant losses of forest carbon and recovery.

Deforestation is often driven by well-supported agricultural and timber policies, international markets for agricultural and forest products, population growth, and expansion of road networks. Forest degradation also includes population density, firewood harvest, selective logging, grazing, and subsistence agriculture. Experience has shown that returns from forest degradation are low and that, in some cases, degradation can be abated more easily than deforestation (Trines, Hohne et al. 2006).

In an analysis of the role of the forestry sector in mitigating climate change, the IPCC (2007) found that “Reduced deforestation and degradation is the forest mitigation option with the largest and most immediate carbon stock impact in the short term per ha and per year globally because large carbon stocks (about 350–900 tCO$_2$/ha) are not emitted when deforestation is prevented” (Nabuurs, Masera et al. 2007).

Although a significant focus at the international level is on REDD policies and credit design, the success of REDD ultimately lies in the hands of host countries and their abilities to reduce deforestation. Therefore, it is important to consider the priorities and historic forest uses of stakeholders in the forested regions targeted for project implementation. Further, policies must align with existing governance institutions, and institutional linkages must ensure that benefits from the generation of carbon credits reach local communities and stakeholders.

Some of the greatest challenges facing REDD are the varying national circumstances and capacities of would-be host countries. Many of these countries have been unable to stop deforestation in the past because of weak institutions and governance mechanisms that are not effective, transparent, or equitable. Even if sufficient funding is made available, these countries will be unable to successfully implement REDD projects unless they are able to strengthen forest management practices, and monitor that, as well as align other land-use policies (such as agriculture) with forestry policies, and engage local stakeholders in the project design process.

An overriding principle of policy approaches to the role of forests in climate change mitigation and adaptation must be coordination at the regional and national levels. For REDD and SFM to succeed, their elements must be

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22 Watson, Noble et al. 2000
23 Idem note 18.
24 Idem note 18.
25 Idem note 18.
26 Idem note 18.
27 Idem note 18.
integrated into national development strategies and part of a national land-use planning. Moreover, they should be incorporated in national forest programs or other equivalent national forest policy frameworks.\textsuperscript{28} Under the brazilian scenery, it is correct to say that the lessons learned internationally must lead to immediate reflections about the need of a coordinated national strategic plan for forestry sector. It may represent the change in view of colonial paradigm to give value to standing forest.

In Brazil, the great concern in terms of REDD is related to the financial formula to be adopted in COP-15 negotiations, as it is known that developing countries have insufficient financial resources to implement effective measures for forest based climate change mitigation and adaptation. The UNFCCC has created a fund to assist adaptation measures, however it is not yet applied to Brazil as the conclusion of a personal meeting in UN Donnors Fund last July 29\textsuperscript{th}, during ground research.\textsuperscript{29}

Other internal concern relates to agroforestry systems’ ability to qualify or not for REDD funding as well as the intensification of deforestation rates in case farmers benefit intensively from carbon funds.

Under these challenges, risks and opportunities we can affirm that achieving climatic benefits through REDD will depend on the design of a workable compensation mechanism and on striking appropriate tradeoffs between environmental integrity, political and economic incentives, and scientific pragmatism regarding data requirements. It will also require a careful analysis of land use change dynamics in individual countries.\textsuperscript{30}

Regarding climate change plans in Brazil, the Brazilian Climate Change Forum was created in 2000 (Decree 3.515/2000). The Interministerial Committee on Climate Change (Decree 6.263/2007) elaborated the National Plan on Climate Change (PNMC). The PNMC is divided into sections (I) mitigation; (II) vulnerability, impact and adaptation; (III) research and development; (IV) capability and divulgation. Identifying environmental impacts caused by climate change and the support of scientific research to define adaptation strategies with reduced socio-economic costs are part of the specific aims of the PNMC.\textsuperscript{31} On the one hand the Brazilian National Climate Change Plan is an important tool that gives guidance to public and private sector policies, on the other hand it demonstrates, some difficulties in presenting clear goals or measurable and reportable objectives, because although the Plan sets forth provisions on specific issues like deforestation, flexible measures were enacted after 2007.

\textsuperscript{28} Idem note 9.

\textsuperscript{29} United Nations Multi-Donor Trust Fund Office United Nations Development Group. Meeting REDD negotiation, visit and personal interview, part of the ground research occurred in the New York UN Office, dated July, 29\textsuperscript{th}, 2009.

\textsuperscript{30} Idem note 9.

representing real barriers to the achievement of the Plan’s outcomes and, consequently, to reduction of emissions. \(^{32}\)

\(^{32}\) Recent tribunal decisions against flexible measures favouring deforestation. See at: http://www1.folha.uol.com.br/folha/ambiente/ult10007u659447.shtml
Table 2. National Plan on Climate Change (PNMC) - Brazil

<table>
<thead>
<tr>
<th>Entity</th>
<th>Aims</th>
<th>Process for development</th>
<th>GHG emission scenarios</th>
<th>Overview and scope</th>
<th>Examples of proposed mitigation interventions</th>
<th>Observations on mitigation interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter-Ministerial Committee on Climate Change, December 2008.</td>
<td>To identify, plan, and coordinate the actions and measures that can be undertaken to mitigate GHG emissions in Brazil, as well as those necessary for the adaptation of society to the impacts that occur due to climate change.</td>
<td>President initiated PNMC in April 2007 on the recommendation of the Ministry of Environment and Brazilian Forum on Climate Change. In November 2007, President appointed Inter-Ministerial Committee on Climate Change (CIM) to oversee Plan. CIM surveyed ministries to identify actions that could be incorporated and solicited input through a stakeholder consultation process. Initial version released for public comment in September 2008; criticized for lack of clear goals. Revised version released December 2008.</td>
<td>Cites the IPCC as scientific consensus that anthropogenic climate change is occurring. Presents national emissions data from 1994. States that Brazil has contributed little to the problem in terms of comparative per capita and per area emissions. Mentions that Brazil will not wait for others to act to mitigate climate change, and characterizes its actions as ambitious relative to those of others. Frames actions in the plan in terms of contribution to efficiency of the economy.</td>
<td>Covers energy (renewable, clean energy, biofuels, consumption reduction, oil and gas); forests and agriculture (ecosystem conservation, agriculture and ranching, strengthening sinks); and other sectors (industry, waste, transport, and health). Plan lists 32 activities in implementation and 13 activities in the &quot;conception phase&quot;. Addresses mitigation, adaptation, education and communication.</td>
<td>Energy generation/use • Add 7,000 MW of renewable energy from bagasse cogeneration, mini-hydro, and wind; increase bagasse cogeneration to 136 TWh (11.4% of energy mix); add 34,460 MWh from hydro. • Solar water heating to reduce energy needs by 2200 GWh/year. Transport • Increase share of rail and water transport; improve mass transit, bicycling, and river cargo. Forests • Reduce deforestation by 40% by 2009, and an additional 30% by 2013 and 2017; eliminate illegal deforestation. • Complete a carbon stock inventory and national public forest registry. • Eliminate net loss of forest cover including by doubling area of forest plantation to 11 million ha by 2020, and increasing annual planting. Waste • Recuperation of methane from landfills • Increase urban solid waste recycling by 20% by 2015.</td>
<td>Activities are categorized as “in implementation phase” or “in conception phase.” Some activities in implementation date from the 1990s or earlier others are newer. Activities “in conception” include both relatively untested ideas as well as others that are being actively explored. New deforestation goals are set, noting that international support is helping realize these efforts.</td>
</tr>
</tbody>
</table>
The National Plan on Climate Change was launched on 1st December 2008 by President Luiz Inácio Lula da Silva, exactly in the first day of COP 14 negotiations, Brazil announced its climate change policy, by setting measures to reduce deforestation however not considering trading the carbon stored in forests.

The barriers to conservation of the Amazon forest are institutional, socioeconomic, economic, and ecological. They are deeply intertwined, but considering them into their principal components helps to make clear their respective importance. The institutional barriers for the conservation of the Amazon forest ecosystems comprise administrative/legal challenges and irregularities across and along scales, from the organizational to the national policy level. In remote areas unclear land tenure, relative inaccessibility, and resulting ownership conflicts may hinder conservation efforts. Several authors point out the detrimental effects of poor law enforcement, mismanagement, perverse economic incentives, and corruption that set up a framework for uncontrolled and arbitrary exploitation of natural resources (Bulte et al., 2007).

A key issue for effective post-2012 forest-based arrangements on climate change is accelerating progress in national and international governance reforms to ensure equity and fairness in the costs and benefits of forest-related mitigation and adaptation.

3.1 Forestry Code – changes, positive and negative impacts

The forestry sector plays an important role in Brazilian economic sector and in the livelihoods of the major part of local population. Forestry management must respect a balance between the rational use of natural resources and the local communities’ needs.

There is still uncertainty about the direction, magnitude and the rate of climate change in Amazon region what reinforces the urgency the issue deserves on the part of scientists and political leaders. Preliminary studies carried out by INPE (National Institute for Space Research) and LBA (Large Scale Biosphere-Atmosphere Experiment in Amazônia) point out to a negative scenario concerning climate change impacts on biodiversity. In a more radical scenario scientists estimate a gradual process of savanization of the Amazon region (Nobre, C.2007) (Marengo, J., 2007). Therefore, not only Brazil and the neighbour countries, but also all of the countries in the world must be responsible for the future of this biome. Reducing carbon emissions from

33 Idem note 8.
Deforestation is a measure to avoid increasing global warming. The creation and coherent design of protected area systems is a form of mitigation, while the adoption of sustainable development production system can be viewed as adaptation.

Several perspectives can be laid out and debated on what are likely to be effective conservation strategies for Amazonia in the 21st Century. The Amazonian rainforest plays a crucial role in the climate system. It helps to drive atmospheric circulations in the tropics by absorbing energy and recycling about half of the rainfall that falls upon it. The resilience of the forest to the combined pressures of deforestation and climate change is therefore of great concern, especially since at least one major climate model predicts a severe drying of Amazonia in the 21st century (Cox et al., 2000; Cox et al., 2004).  

The Amazon region has been losing an average of approximately 17,000-18,000 km² per year of the forested area since the early nineties, with the most intense deforestation in the states of Pará, Mato Grosso and Rondônia (Ferroukh L., 2003).

Forestry sector in Brazil faces serious structural problems such as non-defined landholding situation, the institutional gap between the regulatory marks and the state operational capacity to supervise and enforce laws; infrastructure deficits in technical assistance and financial resources in federal, state and municipal levels. These structural problems impacts differently the local groups that utilize the forestry resources, as settlers, extractors, river dwellers and indigenous peoples, in a scenario of predatory exploring.

The rush for land in the region during the 1970s and 1980s due to government incentives taught Amazon observers and planners that with only precarious infrastructure, huge distances, and limited resources, the Amazonian governments have frequently lacked effective control over land use. In particular, the state lacked the capacity to provide the many needs of migrants to set up viable and stable farms in the region. The chain of events set off by building roads straight into intact rainforests has repeatedly shown the difficulty of controlling behaviour of lumberers, land speculators, small farmers, miners, and even large ranchers and corporations. Violence and ineffective legal system have led to the frontier being quite dangerous for environmental agency officials, activists and politicians.

Considering the land surface of the Legal Amazon (4.91 million square kilometres), around 23% of the region is supposedly in private properties, but those lack any validation in the land cadastre maintained by the National

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The landholding uncertainty affects the small landowners directly and represents a relevant obstacle to the approval of sustainable forest management plans and authorized deforestation plans by the state and local official agencies. In an attempt to reduce this uncertainty regarding rights and to legalize various existing occupations, the Federal Government, together with the Legislative Branch, have been promoting changes in landholding legislation according to the provisions of Federal Law 11.763/2008, Provisional Measure 422/2008, and Federal Law 11.952/2009.

Table 3. Land Title Regulation of Public Lands in the Legal Amazon

<table>
<thead>
<tr>
<th>Size of the Area (hectares)</th>
<th>Procedure</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
<td>property subject to legitimization as provided for in art. 29 of Law no. 6.383/1976.</td>
<td>preference for acquisition of area, for the historical value of the naked land, once the requirements for permanent residency and effective culture have been met, for a minimum period of one year.</td>
</tr>
<tr>
<td>More than 100 and up to 15 fiscal modules</td>
<td>areas subject to land title regulation as provided in art. 17, item II, of the § 2, of Law no. 8.666/1993, according to the wording of art. 1 of Law no. 11.763/2008.</td>
<td>concession of title deed or in rem right for use of property, waiving bid, which fulfills the minimum requirements of cultivation and residency.</td>
</tr>
<tr>
<td>More than 15 fiscal modules</td>
<td>alienation of rural property owned by the Union, via bid, in accordance with Law no. 4.504/1964 and others.</td>
<td>concession of title of ownership or in rem right for use of property, with bid.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Date</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisional Measure no. 422/2008</td>
<td>March 26, 2008</td>
<td>new draft of item II of § 2-B of art. 17 of Law no. 8.666, dated June 21, 1993, <em>in verbis</em>: &quot;II – limited to up to fifteen fiscal modules, and it is forbidden to waive bidding processes for areas surpassing this limit.&quot; which allows for the concession of land titles or right <em>in rem</em> of use, waiving bidding for individuals that possess property of up to 15 fiscal modules in the Amazon, which corresponds to property of 450 to 1,500 hectares, depending on the fiscal module of the Municipality...</td>
</tr>
<tr>
<td>Law no. 11.763/2008</td>
<td>August 1, 2008</td>
<td>new draft of item II of § 2-B of art. 17 of Law no. 8.666, dated June 21, 1993, which regulates art. 37, item XXI, of the Constitution, and institutes standards for bids and public administration contracts. Increase to up to 15 (fifteen) fiscal modules the rural area of the Nation, located in the Legal Amazon, subject to regularization, via concession of land title or right <em>in rem</em> of use, waiving bidding process.</td>
</tr>
<tr>
<td>Law no. 11.952/2009</td>
<td>June 25, 2009</td>
<td><em>Deals with the land title regulation of occupations occurring on lands located in Union areas, in the area of the Legal Amazon; amends Laws nos. 8.667, dated June 21, 1993, and 6.015, dated December 31, 1973; and provides for other measures</em></td>
</tr>
</tbody>
</table>

Efforts to promote landholding regularization meet different interests in the Amazon region, including environmental conservation, agricultural practices, recognition of indigenous and local communities’ rights and incentives for sustainable production.

Several sectors of civil society and government agents contested the new regulation and landholding plan under the argument that the provisions deviated...
from the practical targets aimed such as promoting social inclusion, agrarian justice, indigenous rights protection and controlling deforestation rates. Entering with some actions of inconstitucionality.\textsuperscript{40}

The second structural problem concerning the current legal and administrative situation is the acknowledged gap between the content and aims of legal provisions and the lack of operational capacity on the part of environmental agencies to supervise and enforce laws particularly in the Amazon region.

The current trend, influenced by the status of Brazilian federative structure and the State Constitution of 1988, is a relative political decentralization that permitted the creation of several councils with deliberative powers and new secretariats exclusively dedicated to the environmental issues. However, some states and municipalities still lack institutional capacity and fiscal availability (facilities), the current dynamic is very positive to put into practice public policies and increasing transparency.

As the municipalities have a relatively high degree of autonomy from the state and federal governments, Brazil’s institutional framework favours decentralization of forest management in legal terms. Despite being unclear, the environmental legislation grants the municipal governments some specific forest management competencies and opens possibilities for the different government levels to transfer responsibilities to the municipalities. Nonetheless, the latter have few incentives to assume them and, as was mentioned previously, Brazil’s fiscal scheme does not stimulate the municipal governments to assume an active role in taxing and regulating the forest activity within its territories. Forest management power and decision-making are largely concentrated in federal government hands, and the distance between the federal authorities and local reality explains why forest management is not very efficient. (Ferroukhi et al, 2003).\textsuperscript{41}

In forest management framework, the two most relevant legal marks are Law n. 9985, of July 18, 2000 and the Law n. 4771/1965 (Forestry Code). As a result of the Bill n. 2892/92, the Law n. 9985, dated July 18, 2000 created the National System of Nature Conservation Units (SNUC) by stating the joint participation of federal, state and municipal administration in forest resource management, covering all public conservation units, in federal, state or municipal level. Among its aims, SNUC states the following:

\begin{itemize}
  \item a) Genetic conservation;
  \item b) Protection of Hydrological Cycles;
  \item b) Protection to Fauna and flora extinction species;
  \item c) Sustainable Development;
  \item d) Good practices for conservation of natural resources;
  \item e) Natural Landscape Protection ;
  \item f) Environmental management ;
\end{itemize}

\textsuperscript{40} Unconstitutional: Conflicting with some provision of the Constitution. A statute found to be unconstitutional is considered void or as if it had never been, and consequently all rights, contracts, or duties that depend on it are void. Similarly, no one can be punished for having refused obedience to the law once it is found to be unconstitutional. – Dictionary of Legal Terms, Steven H. Gifis.

\textsuperscript{41} Idem note 37.
g) Biological diversity and tourism; h) Livelihoods of local communities.

According to the legal provisions the three government levels may create ‘Integral Protection Units’, where natural resource exploitation is unauthorized, and ‘Sustainable Use Units’, that may be exploited according to previously negotiated management plans.

Integral Protection Units divides into the following conservation unit categories:

I – Ecological Station;  
II – Biological Reserve;  
III – National Park (state or municipal);  
IV – Natural Monument;  
V – Wildlife Refuge.

Sustainable Use Units divides into these other conservation unit categories:

I – Environmental Protection Area;  
II – Area of Relevant Ecological Interest;  
III – National Woods (state or municipal);  
IV – Extractive Reserve;  
V – Fauna Reserve;  
VI – Sustainable Development Reserve;  
VII – Private National Patrimony Reserve.

SNUC legislation demonstrated an evolution in Brazilian legal framework as well as it is an example of a successful model of public policy by incorporating modern concepts and coherence in dealing with other conservational policies. Otherwise, SNUC was responsible to launch a new relationship between local communities and those living in the Protection Units. Pros and cons of this system may be seen in more details in item 4.2.3, “c”.

The most relevant and polemic law, however, is the Forestry Code (Law n. 4771/1965) by gathering a number of provisions regulating soil use in public and private areas, the creation of parks, public forests, reserves and introducing the legal concept of ‘permanent conservation area’ and ‘legal reserve’. The Code also established the obligation of owners to conserve at least 50% of the forest cover on their properties as legal reserves and reduce deforestation rates. The federal government published the Provisional Measure n. 1956/96 originated by the Provisional Measure n. 1511/96 setting forth an increase in the proportion of legal reserves from 50% to 80% of the property. Another modification was that the code became the obligatory forest management regulation for timber extraction in native tropical forests.
Since Brazil’s imperial age, there have been concerns regarding the conservation of native forest species, especially those with high commercial value. One example of this was the Executive Order of 1827, which established protection of the so-called “hardwoods”, precious forest species that are very suitable for civil construction. Therefore, the forest issue is longstanding in Brazil.
In 1934, the Brazilian Forest Code was instituted during the Getúlio Vargas administration, via Executive Order no. 23.793. This norm was revoked during the military government of President Castelo Branco, which proposed the New Brazilian Forest Code, in the form of Law no. 4.771/1965, which is still in effect today. Since then, the new code has undergone several changes, which took place through the following normative ruling: Law no. 5.106, of 1966; Law no. 5.868, of 1972; Law no. 5.870, of 1973; Law no. 7.803, of 1989; Law no. 9.985, of 2000; Provisional Measure no. 2.166-67, of 2001; Law no. 11.284, of 2006. In addition, presidential decrees and several National Environmental Council (CONAMA) resolutions have complemented or are based on the instructions of this code, as well as on state and municipal normative ruling.

Thus, despite the changes that have taken place, the current code still preserves its basic structure, which was formulated in 1965, when the agrarian reality of Brazil was much different than it is today. The Center-West and North of the country were still sparsely populated, for example. Yet, technological development and the growth of agricultural markets have provided for agriculture’s advancement over new areas. In the ‘70s, the Brazilian government itself stimulated the migration and occupation of these regions of the country as a way of developing Brazil’s inland regions. Some examples were: the Japanese-Brazilian Cooperation Program for Development of the Cerrados (PRODECER); the construction of the Trans-Amazonian Highway; and the National Integration Program (PIN), which put colonization and agrarian reform policies into place in the Northern Region. In parallel, there has also been an increase in illegal land appropriation by squatters, especially in the Amazon, which is still facing serious problems with regulation of landholdings and titles.

Therefore, with the increased environmental restrictions contained in the forest code and other similar normative ruling, a confrontational situation has arisen between the policies that encourage occupation of areas in the Amazonian and Cerrado biomes and the new environmental policy. Moreover, the new dynamic of Brazilian agriculture also demands new improvements in the forest code, so as to reach greater efficiency and functioning of this norm.

In this sense, a new review of the Forest Code has been widely debated in the Brazilian Congress, where there are several Bills being considered regarding this aspect, with proposals to change the code. Along these lines, it is worth noting the importance of appreciating a balanced and technically-based debate, considering both the reality of agriculture as well as of Brazil’s biomes. Another important aspect is making the process of environmental adaptation less burdensome and bureaucratic for farmers. Advancements that promote greater ease for implementing and overseeing the code are also desirable.
4. INITIATIVES FOR THE SUSTAINABLE DEVELOPMENT OF THE AMAZON REGION

4.1 The Sustainable Amazon Plan.

The Sustainable Amazon Plan (Plano Amazônia Sustentável – PAS) was born in May, 2003, within the federal government’s initiative for the institutionalization of a National Policy of Regional Development in a moment when new strategies and planning were needed to guide federal and state public policies. In June of the same year, the Interministerial Coordination Committee was created under the supervising of Integration Ministry and with the Environment Ministry as the executive secretariat.\(^\text{42}\)

It comprises a set of measures in attempt to harmonize strategies of productive sectors and environmental policies for the Amazon region.

The National Policy of Regional Development is based on two key issues as such the ‘diversity’ and ‘inequality’ both seen by the territorial perspective and historic regional development.

The aim is to integrate the Amazon region in the process of development stimulating the exploration of the regional potential economic activities and creating income for the local population.

According to the cooperation agreement signed in Rio Branco by the federal government and state governors, PAS comprehends the North Region and the states of Acre, Amapá, Amazonas, Pará, Rondônia, Roraima e Tocantins, some parts of Mato Grosso, Goiás and Federal District.

PAS gives an innovative approach for economic development and demonstrates the governmental orientation to launch a new long-term development strategy to promote social inclusion, income justice, and sustainable development. The agreement still proposes the increase in productivity and reduction of socioeconomic vulnerability reducing the regional inequalities and income concentration according to a new development paradigm.

A new regional financial standard must be implemented in order to meet the following aims\(^\text{43}\):

a) Reduce inequality by providing a just distribution of financial resources among the regional states;

b) Stimulate technological innovation;

c) Be an important instrument of environmental sustainability;

d) Incentive partnership among regional development agents;

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\(^\text{42}\) PAS (Plano Amazônia Sustentável) See at: http://comissao.amazonianet.org.br/pub/publicacoes/d2b12f44dac5cad8b133fd0d7e9357d0.pdf

e) Implement intra and inter-regional integration of local productive chains.

The Action Plan for Protection and Deforestation Control of in the Legal Amazon comprises four strategic areas:\(^{44}\):

a) Territorial and Landed-Estates Zoning;

b) Environmental Monitoring and Control;

c) Promotion of Sustainable Activities;

d) Environmentally Sustainable Infrastructure.

As to the Territorial and Landed-Estates Zoning it comprises the following strategies:\(^{45}\):

i) Conservation units estimated in 82,000 square kilometers (an area twice the size of Holland) have been created in conflict areas and places where agricultural production is expanding;

ii) 93,000 thousand square kilometers (an area larger than Portugal) of Indian land have been permanently demarcated.

iii) Sustainable Settlement Projects (extractives settlements, sustainable development projects and forest settlements) covering 3,760 square kilometers have been created.

iv) A Provisional Administrative Restriction Order has imposed development restrictions inside an area of 82,000 square kilometers along the BR-163 highway.

Concerning the Environmental Monitoring and Control (EMC), PAS strengthened legal sanctions and enforced measures to curb unsustainable logging. Monitoring and enforcement operations have been undertaken, among which the following were particularly successful in breaking up groups of individuals involved in illegal logging:

i) Operation Black September (2003);

ii) Operation Far West (2004);

iii) Operations Curupira I and II (2005);

iv) Operation Green Gold (2005);

v) Operation Rio Pardo (2005);

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\(^{44}\) Idem note 43.

\(^{45}\) Idem note 43.
vi) Operation Clean Lands (2005);

vii) Operation Terra do Meio (2006);


As to the Promotion of sustainable activities the Brazilian government has been fostering sustainable activities in the region fixing some priorities that have included the following:

i) Improvements to the Green Protocol, through which projects and activities must incorporate environmental variables in order to be eligible for tax benefits, and its establishment as a National Monetary Council Norm, which will make it compulsory for environmental variables to be incorporated into technical-assistance projects;

ii) The approval of a Bill for Administering Public Forests, which will make it possible for a Sustainable Forest District to be established;

iii) The stepping up of a capacity-building program created by the National Centre for Forestry Training and Capacity Building (CENAFLOR), aimed primarily at workers engaged in sustainable forest-management and extractives activities.

To ensure that an environmentally sustainable infrastructure is set in place, efforts have been made to strengthen the legislation for:

i) Improving the effectiveness of controls and administrative sanctions governing illegal deforestation;

ii) Introducing a moratorium on deforestation in areas larger than 3 hectares in some of the municipalities of the Legal Amazon region.

The formula to implement a new financial standard for the region depends on the articulation of existing funds with new financial opportunities and new potential sources. PAS established a 1-billion-real (about $600 million) fund for farmers who adopt environmentally-friendly farming methods. PAS offers social security, unemployment benefits, and job training to 40,000 families once involved in logging and will create a landholder registry to counter illegal occupation of public forest land and improve governance in the region.

PAS seeks address some of these issues by offering financial incentives for environmental performance as well as establishing mechanisms for tracking ownership of land. Despite of designing new plans and strategies for integration, it still will be difficult to overcome the broader trends that are driving the destruction of the Amazon Forest. To achieve this aim it will be essential to develop a greater interface between federal and state policies, channels of information, scientific research and enforceable legal framework.
Leaders and representatives, with their higher level of technical knowledge and political experience, are the point of contact between communities and institutions. They shall develop innovative means for improving national-local communication with information symmetry.

Environmental policies should focus on enabling a better adaptation of individuals in the environment they are located, in order to improve their quality of life and encourage greater equity and social justice. Although the public agents design new policies more oriented to these objectives, many problems of implementation and functioning of policy instruments result from an inappropriate institutional structure, which has little flexibility and is very bureaucratic, or does not allow for meaningful participation and thus lack credibility.

Finally, addressing governance, the multi-level political economic processes should be better explored in order to tackle with the tensions between actor’s variable interests and achieving better platforms for debate and negotiation among stakeholders to deliver sustainable development effectively.
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<td>CODAM-AM</td>
<td>Complementary Law no. 53/2007, in article 10 (paragraph 7), about exemption of Rural Land Tax (RLD), deals with tax exemption declaration in rural areas treated within this Law, stating that it’s not needed prior proof by the declaring.</td>
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<td>Amazon State has nowadays one of the most developed environmental legislations in Brazil. The current framework shows a lack of implementation of some essential and important rules. It’s important to highlight that Amazon State concentrates the biggest amount of Brazilian Amazon rain forest, resulting on the huge concern with environmental issues in this State,</td>
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<td>CEMA-AM</td>
<td>Law no. 3417/2009 fixes how and in which ways the use and occupation of land and natural resources is going to proceed.</td>
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<td>Law no. 2411/1996 creates Mamiraua Sustainable Development Reverse aiming to promote local population development, environmental resources protection and mechanisms that help local population to use and supervise all the natural resources that the Reserve biodiversity has.</td>
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<td>Law no. 3167/2007 defines the importance of water in current basis and describes aims and tools of the Water Resources State Plan. Besides that, in article 68 imputes to IPAAM the Water Resources supervise in Amazon State.</td>
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<td>IMA</td>
<td>Law no. 2712/2001 creates mechanisms to protect the aquatic fauna and aquatic sustainable development in Amazon State. Besides that, the Law refers to Economic-Ecological Zoning (ZEE’s) concerning aspects of water resources.</td>
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<td>CEHIDRO-MT</td>
<td>By Law no. 7238/1999, all inserted in Mato Grosso State Agrarian Reform are free to pay Rural Production Contribution Registration.</td>
<td>Law no. 7709/2002 creates the PRODEFLORA (Mato Grosso State Program of Forest Development) and the FUNDEFLORA (Forest Production Support Fund). SEMA can allow forest conversion and exploitation in authorized areas, since presented a project and an Environmental Diagnostic if the area is up to 1000 ha, according with Law no. 308/2008.</td>
<td>Article 30, within Chapter V (Mato Grosso Forest Development Fund) of Law no. 233/2005 aims biodiversity conservation through research, technical assistance, forest extension, reforestation and sustainable use.</td>
<td>Law no. 6945/1997 creates the Water Resources State Policy, defining the water main functions and the policy way of act. Besides that, it’s important to highlight article 7 that shows the importance of the State Policy and the Water Resources National Plan work together. CEHIDRO is the responsible institution of water issues.</td>
<td>Article 4 of Law no. 233/2005 sets forth implementation of international conventions and agreements measures aiming to reduce greenhouse gases emissions.</td>
<td>Mato Grosso State has a lack of environmental laws and policies. There is not legislation setting forth specifically about biodiversity and carbon emissions on the State responsible for a big hole of soy plantation and harvesting.</td>
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<td>SEDAM-RO</td>
<td>By Law no. 1973/2008 States about the complementary Credit till 1.300.000 to State Secretary of Environmental Development.</td>
<td>Law no. 1143/2002 states about the sustainable use of state forests and extractive reserves.</td>
<td>No existing state legislation.</td>
<td>Law no. 255/2002 Creates the Water Management System and Policy. Law no. 2137/2009 creates the permanent campaign for protection of water resources and rational use of water.</td>
<td>No existing state legislation.</td>
<td>Law no. 72/1985 states about the protection of natural beauty for ecologic tourism.</td>
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- Law no. 6.251/99: Creates the Ecologic Seal.
- Law no. 5440/88: Creates the State Institute of Forestry.
- Law no. 6194/99: Prohibition of extraction (bushes, trees, and wetlands).
- Law no. 5630/1990: States about conservation of fountain and water sources.
- Law no. 6105/98: States about conservation and protection of underground water.
- Law no. 6116/98: States about the prohibition of building residential units close to sources of potable water.
- Law no. 5.629/1990: States about the conservation of historic, artistic, natural and cultural patrimony.
4.2 Payment For Environmental Services

4.2.1 Definition and Criteria

The theoretical basis of payment for environmental services (PES) schemes is not recent; the key concepts of externalities and public assets date to at least the early 20th century. However, it is only in recent decades that PES has gained space in publications throughout the world as well as having served as the basis for several practical experiments in public policy.

PES schemes are derived from the Coase Theorem, of 1960, which states that, in the absence of transaction costs, agents internalize externalities and achieve efficiency through negotiation, regardless of the initial allocation of property rights (KOSOY et al, 2006). According to Coase (1960), externalities occur when individuals act, causing effects on other individuals without their consent, and these effects can be beneficial (positive externality) or harmful (negative externality).

Payments for Environmental Services (PES) are being discussed at the global level. They have been pointed to as promising instruments for environmental management on different scales. Pioneering experiments and local mechanisms for success have shown that PES can be an effective and economically efficient alternative that work in conjunction with the traditional instruments of command and control that dominate environmental policy in the Amazon region. (Wunder, 2007).

In addition to scientific studies that have demonstrated the efficacy of PES, several areas of thought in academic literature defend the fact that PES schemes represent substantial benefits to improving the quality of life of service providers (Landdell Mills, Porras, 2002).

In academic terms, it is worth mentioning the contribution of the Economy of Well-Being and the Ecologic Economy in formulating the concept of environmental services. From the former comes the view that, in market relations, there is a group that does not comply with the contract established between the parties. This group, or externality, can be beneficial or harmful for society. In the first case, according to Cecil Pigo (1997), the State should develop mechanisms to compensate or stimulate its production. In the second,

it should charge for the damages caused to third parties or to the society as a whole. 49

A fierce debate on PES began in Brazil starting in 2000 with the launch of the Proambiente program, which garnered positive results and showed the obstacles and challenges to pioneering experiments in several locations in the Amazon region. Starting with these first data and results, various legislative bills began to be proposed in an effort to include PES on the list of environmental policy instruments in the country. Currently, the Brazilian system has command and control instruments and has created protected areas as parts of the environmental policy which contributes to maintaining environmental services in the Amazon region.

Much debate has emerged since then concerning the need for new conservation paradigms. The charges from payments for environmental services (PES) that pay farmers and landowners to conserve water and forests are seen by specialists as extremely promising for conservation of ecosystems. This issue is expected to move forward during the Climate Summit in Copenhagen in 2009, through definition of a global regulatory framework for this mechanism. In Brazil, the issue is being discussed and some important advances can already be seen.

Brazil’s Ministry of Environment, via its Environment and Sustainable Development Committee, drafted bill n. 792/2007 in July of 2009, which would regulate ‘payment for environmental services. The bill provides the concept of environmental services and states how they work. It proposes institutionalization of the ‘National Policy for Payment of Environmental Services’ and a program for implementation of this policy that will establish other actions and provide financial incentives to the main actors to maintain native vegetation areas at increased levels, as compared to current Brazilian law.

The bill was attached to four previous propositions, yet this bill is relevant because it was sponsored by the Ministry of Environment, even though the executive branch has the prerogative to present propositions with financial mechanisms of support and to determine the budget for implementing environmental projects and measures.

Payment for environmental services, according to the Ministry of Environment, may be done directly or indirectly with the backing of the public authority or the market. The main issue of the debate is how to quantify the costs and identify the financial sources.

The bill regards the rendering of environmental services to be the maintenance of native vegetative cover (standing forest) in areas that extend beyond the legal reserve as defined by the Permanent Preservation Areas’s legislation and reserves were initially estimated at R$ 100 million (about U$ 60 million) for land

owners and R$ 4 billion (about U$ 2.5 billion) when the services are completely implemented.

The aforementioned costs will be rated by their main beneficiaries, namely Brazilian society, the federal budget, and the international community, which benefits from the carbon sequestration that takes place in forests. The economic sectors that depend on natural resources, such as agriculture, livestock farming, hydropower plants, and the oil industry will donate funds to the ‘Fundo da Amazônia’ (Amazon Fund) and may contribute through payment of carbon credits, since these sectors generate environmental impacts that can be mitigated by conservation of vegetation.

The main aim of ‘payment for environmental services’ is to demonstrate the direct economic benefits of conservation. In several parts of Brazil, we can highlight pioneering actions and results, the majority of which, although incipient, have demonstrated initial results in providing preservation for vegetative cover and water resources (mananciais). The first carbon sequestration projects to compensate farmers in return for maintenance of vegetative cover on their lands can also be seen. The core idea of PES is that external ES beneficiaries make direct, contractual and conditional payments to local landholders and users who in return adopt practices that secure ecosystem conservation and restoration.50

According to the definition contained in environmental literature, environmental services are activities, products and processes that nature provides us, making it possible for life as we know it to go forth without incurring greater costs for humanity. There are many types of environmental services provided in a natural and free manner by ecosystems in order to maintain appropriate environmental conditions on the Planet. Environmental services provided by nature supply us with products such as foodstuffs, natural medications, fibers, fuels, water, oxygen, etc., and guarantee the good functioning of natural resources including climate control, water purification, rain cycles, climate balance, oxygen, soil fertility and recycling of nutrients that are necessary for agricultural purposes, for example.

Although no prices have been established, environmental services are very valuable to the well-being and the very survival of humanity, since human activities such as agriculture and industry depend on them.

The continuity or maintenance of these services, which are essential to the survival of all of the species, is directly dependent upon conservation and environmental preservation, as well as practices that minimize human actions on the environment. Traditional peoples and communities who have historically preserved the environment and used its resources and services in a conscious and sustainable manner have also been responsible for supplying these environmental services, and they are what we call environmental service providers.

Bill n. 792 of 2007, which was undergoing discussions among the Steering Committee of the House of Representatives on October 21, 2009, contains one of the most complete definitions and states that environmental services are those services that are seen as flows of material, energy and information of natural capital inventory that, in combination with built and human capital services, produce benefits for human beings. The concept and examples of environmental services are stated in article 1, while in art. 2, the subjects that are entitled to the payment or compensation arising from them are cited. In art. 3, a deadline of 180 days is stipulated for the Executive Branch to regulate the law and, in art. 4, there is a clause regarding validity.\(^{51}\)

The Bill states that the payment or compensation for environmental services is mostly aimed at transferring resources to those who help to conserve or produce such services. The soil, water resources, biodiversity, fauna and flora, forest resources, the oceans, fishing resources, the atmosphere and sources of energy are listed as natural resources to be preserved.

In the words of the reporter, environmental services are those that originate from the healthy functioning of natural ecosystems or ecosystems modified by human beings. To illustrate, the production of oxygen by plants, the capacity to produce water and the balance of the hydrologic cycle, the fertility of the soil, the vitality of the ecosystems, the landscape, climactic balance and thermal comfort can all be mentioned. Maintaining environmental services, or rather, the ability of the ecosystems to maintain appropriate environmental conditions, depends on the implementation of human practices that minimize humans’ impact on the ecosystems.

In the same vein as the Bill, the payment or compensation for environmental services is mostly aimed at transferring resources, both monetary and non-monetary, to those who voluntarily help in the conservation or in the production of the aforementioned services. Because the effects of these services are enjoyed by all, it is fair that those responsible for them receive incentives. The idea is that it is not enough to merely tax those who degrade the environment, it is necessary to earmark resources for those who voluntarily guarantee these services.\(^{52}\) The PES mechanisms and international funds to forestry conservation must not interfere in the sovereignty and the autonomy of the countries to propose endogenous policies.

### 4.2.2 PES types, benefits, efficiency and barriers

The PES forest systems examined in Brazil (up until now) have consisted of environmental services associated with four different categories, represented by the four ES types:

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\(^{51}\) Bill n. 792 of 2007. Environment and Sustainable Development Committee.  
\(^{52}\) Idem note 51.
a) Carbon sequestration and storage (e.g. carbon sequestration from growing vegetation, retention of carbon in the soil and in the vegetation). The benefit is the mitigating effect of climate changes caused by anthropogenic emissions.

b) Protection of Biodiversity (e.g. structure and regulation of ecosystems, genetic diversity). Benefits which are paid for: value of option (future use) and existence (awareness of its existence and importance).

c) Watershed protection (e.g. water purification, regulation of flow and sedimentation). Benefits: quality and quantity of water.

d) Beauty of the landscape (natural or cultural landscapes). Benefits: recreation and tourism opportunities.

In addition to the items categorized above, it is necessary to also mention that the Amazon rainforest plays a very important role in regulating pluviometric precipitation in other regions of the country. This precipitation produces effects on the agricultural productivity of several other regions, as well as influencing regulation of the climate, an activity that would be hard to measure in spatial terms since this affects the entire planet and depends on specific studies of environmental modeling.

Kosoy et al. (2007) state that in order for PES schemes to be efficient, they need to have two conditions: the payments should cover at least the cost of the opportunity to use the land to be compensated, and the amount to be paid should be less than the economic value of the environmental externality. Regarding the first condition, if the cost of the opportunity is not covered by the payment, the landowner will have no incentive to adopt the use of the soil or the encouraged practice. The amount paid should be less than the economic value of the externality, because if it were greater, the user would prefer to suffer the externality and break the law.53

From an efficiency point of view, the experiences of PES in several parts of the world have demonstrated that there are some conditions for the efficiency and implementation of PES.

The economic condition concerns the existence of an externality (an external benefit for the environmental service provider) that demonstrates an added value to be compensated. In this sense, PES can only be applied if payment at a higher value than the cost of providing the externality is made available, which, for the reality of the Amazon Forest, is highly plausible for around 50% of the forest area (Wunder, 2005).54

The cultural condition involves the providers of environmental services, who will react positively to economic incentives. If the main actors are not motivated


54 Idem note 50.
enough to receive payment so as to change the paradigm of conduct (behavior) concerning land use practices, the PES will not work.

The institutional condition refers to the prospect of establishing a minimum level of credibility among users and providers of services indicating a scenario of mutual fulfillment of PES contracts. Frequently, users and providers have conflicting interests and an honest intermediary negotiator would be very useful. Another aspect of this condition is the need for an institutional infrastructure that is able to efficiently manage the transfer of PES, skirting any problems concerning the modes of land use rights that in fact ensure effective rights of exclusion of use on the part of third parties. This point is essential to a successful PES scheme in the Amazon region, because if property rights, use rights and rights of exclusion were inconsistent due to a lack of definition of the dominion and the land conflicts persisted or if the scenario were one of free access, it would be unfeasible to implement healthy PES schemes (Wunder, 2007).  

Finally, we must point to information as a condition related to the estimation (definition and measurement) of environmental services that service providers will be compensated for, as well as the negotiation of contracts. A very relevant aspect to be examined by the actors when dealing with PES is the transaction costs that can prove to create a true bottleneck between users and providers.

Many see PES as a threat rather than an opportunity, regardless of its potential virtues. At this stage, mainstreaming PES in the tropics probably faces two key obstacles and a communication barrier. The first obstacle is limited demand: too few service users are so confident in the mechanism that they are willing to pay – in some cases, because the link between land use and ES provision is insufficiently understood or ambiguous. (Wunder, 2007).

Communicating the PES concept is a problem and represents another barrier. Proponents often use an economic rationale, while skeptics draw on other social sciences. (Wunder, 2007). However, the real obstacles are the mechanics of incentives and livelihood, which so far have received comparatively less attention.

Concerning legal obstacles, we can point chiefly to two situations that must be examined while the previously mentioned congressional bills are passing through congress. The lack of a legal base at the federal level has been the main impediment for Proambiente, despite not having significant legal limitations for private PES, which are those organized by funds or other intermediaries that transfer resources from purchasers, such as private companies, donators or international cooperation agencies for the payment for services. The current discussion on the passage of Bill no. 792/2007 to institute environmental services and their compensation at the federal level makes it possible to believe that this obstacle to public PES can be overcome in the near

55 Idem note 47.
56 Idem note 47.
57 Idem note 47.
The other legal barrier to be examined is the legislation concerning the Legal Reserve in rural properties, namely Law 7.803, dated July 18, 1989, which also introduced the requirement for annotation or registration of legal reserve to be entered as a marginal note to the registration of the property, and which prohibits “alteration of its use, in the cases of conveyance, for any reason, or subdivision of the area” (Art. 16, § 2). In this matter, public payments to landowners with environmental forest liabilities would be considered to be illegal, although private payments would not be affected.

Another relevant point to consider from a structural and institutional standpoint would also be the absence of environmental agencies with an adequate institutional capacity and the inter-institutional coordination to manage large scale payments and carry out oversight, enforcing the laws by applying the necessary sanctions to breaching parties.

4.2.3 PES Scope and pioneering experiments in Brazil

Specialists see payment for environmental services as an efficient manner of estimulating environmental preservation, since it reconciles preservation activities with the creation of income, especially in the rural medium where maintenance of preserved areas is usually seen as a loss by producers whose productive areas are reduced by the legal reserve and permanent preservation areas. The UN (United Nations) via its FAO (Food and Agriculture Organization) published a report in 2008 wherein it defends the best manner of avoiding agricultural pressure, which has tended to grow more and more, on forest areas.

On the other hand, there are those who state that something like preserving the environment, which is everyone’s obligation as established by law, should not be paid for. This group would also argue that there is a huge risk in remunerating landowners so that they will preserve Amazonian forests where there is substantial illegal squatting and logging occurring, for example. Who will guarantee that they will really stop destroying the forest as they have done up to that point just because they have received this payment?

Another controversial point of the PES concerns who should receive the funds. There are those who say that the PES is only for producers who have kept their forest areas intact, or rather, who are in compliance with the law. However, if this were the case, producers who could carry out area recovery and reforestation projects would be left out, which would make this type of project practically useless in locations such as the State of São Paulo, which only has 8% of its original forest cover.

The first initiatives along these lines came about in the ‘90s in Costa Rica, where a system was created that taxed fuels in order to use the funds raised to remunerate landowners of preserved lands. Like Costa Rica, Mexico and
Ecuador have consolidated public PES policies, yet there are similar initiatives throughout the world.

In the area of Brazilian legislation, it could be said that the legal device that preceded compensation for environmental services was Law 7.990/89, which instituted financial compensation for the States, Municipalities, and Federal District using the results of oil or natural gas exploration, water resources to generate energy, and other mineral resources which had already been the target of a constitutional provision in 1988, under the terms of article 20, paragraph 1. In 1989, the Constitution of the state of São Paulo also incorporated the protector-receiver principle and compensation for environmental services.

Based on these legislative precedents, the idea arose for the ICMS Ecológico tax, a mechanism that was seen for the first time in the state of Paraná via the normative provision in Complementary Law no. 59 dated October 1, 1991, and published in the Official Gazette n. 3609 of October 1, 1991. The mechanism was adopted in other Brazilian states such as São Paulo, Minas Gerais and Espírito Santo. Another initiative that deserves mention is Law 9.433/97 which instituted the National Policy and the National Water Resources Management System that recognized water as being an asset of public domain and a limited natural resource that has an economic value whose use can be billed.

Its scope includes building local institutional capacity, generating benefits to ‘buy’ local goodwill towards conservation, and influencing government policies and new regulatory frameworks. Incentives are at the very core of PES (Wunder, 2007).\(^58\)

The PES approach of ‘purchasing conservation’ in a contingent manner is more direct than taxes and subsidies.

The most recent and pioneering initiatives can be seen in the states of São Paulo, Rio de Janeiro, Minas Gerais and Espírito Santo, which include the following programs:

a) Proambiente Program  
b) ICMS Ecológico taxation (Ecological VAT on Sales and Services)  
c) Environmental Compensation  
d) Forestry Replacement  
e) Ecologic Income Tax  
f) Protection of Biodiversity  
g) Forest Easement  
h) Credits for Certified Reduction of Greenhouse Gasses  
i) Credits for Voluntary Reduction of Greenhouse Gasses  
j) Carbon Sequestration  
k) Scenic Beauty  
l) Protection of Hydrographic Basin

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\(^{58}\) Idem note 47.
m) Ecological Economic Zoning

Using the data above, it is possible to examine the most relevant programs which have already begun to produce practical results and estimated measurements.

a) Proambiente Program

Diffusion of the concept of family farming is relatively recent in Brazil. It was only in late 1990s, with the creation of the National Program to Strengthen Family Farming (PRONAF), that the concept began to gain visibility in official documents, in the formulation of public policies.

Ten years after the creation of the PRONAF, Brazilian legislation formalized the concept of the family farmer and family entrepreneur as being a person who carries out activities in the rural medium while at the same time meeting the following requirements (BRASIL, 2008): not hold, by any means, an area larger than 4 (four) fiscal modules; have a labor force made up principally of the family itself working in the economic activities at the establishment or venture; have family income that comes predominantly from economic activities connected to the establishment or venture itself; and run the establishment or venture with the family.\(^{59}\)

The relationship that these farmers establish with the tropical forest can be seen in ways that vary from total economic and socio-cultural dependence to substitution of the native vegetative cover so as to implement farmland and pastures. They undertake a complex system of productive activities involving small plot for planting, cut-over land or fallow, forest, terreiro (flat open terrace on which coffee beans, etc., are spread to dry) or yard areas, the practice of vegetative or animal (hunting and fishing) extractivism and raising animals (poultry, small animals and cattle) (HOMMA, 2006).\(^{60}\)

The need to develop a custom model for agriculture and livestock to be used by family farmers in the Amazon was first registered, with the needed emphasis, in 2000, in the conclusions of a study on the impacts of the application of the Constitutional Fund of the North (FNO) in the state of Pará, after ten years of financing small landowners. (Tura and Costa, 2000).\(^{61}\)

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This is how PROAMBIENTE was created, as the fruit of the discussion between the Federations of Agricultural Workers (FETAGs) of the Legal Amazon, the National Confederation of Agricultural Workers (CONTAG), the Amazon Task Force (GTA), the National Council of Rubber-tappers (CNS), the National Movement of Artisanal Fisherpeople (MONAPE), and the Coordination of the Indigenous Organizations of the Brazilian Amazon (COIAB).
<table>
<thead>
<tr>
<th>Timeline</th>
<th>Country</th>
<th>Location</th>
<th>Aims</th>
<th>PES</th>
<th>Beneficiaries</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000: The first preliminary proposal for PROAMBIENTE is made</td>
<td>Brazil</td>
<td>Legal Amazon</td>
<td>Provide credit to smallfarmers</td>
<td>Avoided Deforestation</td>
<td>Family Farmers</td>
<td>Annual Income of one hundred thousand Brazilian reals.</td>
</tr>
<tr>
<td>2001: The IPAM creates the PROAMBIENTE Project, inserted within the “Floresta &amp; Comunidade” (Forest &amp; Community) program.</td>
<td></td>
<td></td>
<td>Promote democratization in traditional public policies.</td>
<td>Carbon Sequestration</td>
<td></td>
<td>80% of the income from rural activities.</td>
</tr>
<tr>
<td>2002: Passage of the Initial Proposal for PROAMBIENTE by the provisory National Management Council. Executive Secretariat, in Brasilia, with the support of the Secretariat of Coordination of the Amazon (MMA).</td>
<td></td>
<td></td>
<td>Public Policy Social control.</td>
<td>Land use</td>
<td></td>
<td>living at the same address for at least one year.</td>
</tr>
<tr>
<td>2003: Inclusion of PROAMBIENTE in the Pluriannual Plan (PPA - 2004/2007), as a Program of the Secretariat of Policies for the Sustainable Development of the MMA.</td>
<td></td>
<td></td>
<td>Land Development.</td>
<td>Soil and Water conservation</td>
<td>Extractivists</td>
<td>have areas of up to 4 fiscal modules.</td>
</tr>
<tr>
<td>2004: Elaboration of the Use Plans for the Properties and the Community Agreements.</td>
<td></td>
<td></td>
<td>Production Units Planning.</td>
<td>Biodiversity Landscape</td>
<td>Fishers</td>
<td>predominantly use a labor force made up of 50% family members.</td>
</tr>
<tr>
<td>2006: first payments for environmental services to families in the hubs of Rondônia, Pará, Acre, Tocantins, and Mato Grosso. Ministerial Decree no. 15, dated January 17, 2006, concerning the creation, purpose, competence,</td>
<td></td>
<td></td>
<td>Implement sustainable development indicators.</td>
<td></td>
<td>Traditional Populations</td>
<td>for artisanal fisherpeople, the modalities of fishing practiced will be considered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Traditional communities are not conditioned to cumulativity</td>
</tr>
</tbody>
</table>
At the end of 2001, 12 Pioneer Hubs were chosen to start implementation of PROAMBIENTE in the Legal Amazon (Table 8). Each of the hubs was planned to benefit up to 500 families, organized in dense local groups, in an effort to have a greater impact in the generation of environmental services. In PROAMBIENTE’s first phase, around six thousand family farmers, rubber-tappers, *ribeirinhos* (people living along the riverbanks whose main subsistence activity is fishing), artisanal fisherpeople, and indigenous people were expected to benefit from the program.

<table>
<thead>
<tr>
<th>Pioneer Hub</th>
<th># of Municipalities</th>
<th>Municipalities Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Baixada Maranhense - Maranhão</td>
<td>05</td>
<td>Viana, Penalva, Matinha, São Batista e Vitória do Mearin.</td>
</tr>
<tr>
<td>2 Bico do Papagaio - Tocantins</td>
<td>04</td>
<td>Esperantina, Axixá, São Miguel e Buriti.</td>
</tr>
<tr>
<td>3 Ouro Preto D’Oeste - Rondônia</td>
<td>06</td>
<td>Ouro Preto D’Oeste, Mirante da Serra, Nova União, Urupá, Teixeirópolis e Vale do Paraíso.</td>
</tr>
<tr>
<td>4 Vale do Apiáu - Roraima</td>
<td>04</td>
<td>Muçajai, Iracema, Cantá e Caracarai.</td>
</tr>
<tr>
<td>5 Vale do Alto Rio Acre - Acre</td>
<td>04</td>
<td>Xapuri, Brasiléia, Assis Brasil e Epitaciolândia.</td>
</tr>
<tr>
<td>6 Laranjal do Jari - Amapá</td>
<td>03</td>
<td>Laranjal do Jari, Vitória do Jari e Mazagão.</td>
</tr>
<tr>
<td>7 Rio Preto da Eva - Amazonas</td>
<td>02</td>
<td>Manaus e Rio Preto da Eva.</td>
</tr>
<tr>
<td>8 Transamazônica - Pará</td>
<td>03</td>
<td>Pacajá, Anapu E Senador José Porfírio</td>
</tr>
<tr>
<td>9 Rio Capim - Pará</td>
<td>04</td>
<td>Mãe do Rio, Irituia, São Domingos do Capim e Concórdia.</td>
</tr>
<tr>
<td>10 Ilha do Marajó - Pará</td>
<td>04</td>
<td>Soure, Salvaterra, cachoeira do Arari e POnita de Pedra.</td>
</tr>
<tr>
<td>11 Nordeste do Mato Grosso - MT</td>
<td>01</td>
<td>Juina.</td>
</tr>
<tr>
<td>12 São Gabriel da Cachoeira - Amazonas</td>
<td></td>
<td>Indigenous populations from several municipalities in the state of Amazonas</td>
</tr>
</tbody>
</table>

Table 8: OLIVEIRA, L.R., ALTAFIN, G. I. Proambiente: Uma Política de Pagamento de Serviços Ambientais no Brasil (Proambiente: A Policy of Paying for Environmental Services in Brazil).
The methodology set forth in PROAMBIENTE accepts the principle of integration of public policies, as a means for achieving greater efficiency and efficacy from the public activities associated with the territory. In this sense, in order to gain the right to be paid for environmental services, families must comply with three initial phases: create a Sustainable Development Plan for the Hub (PDS); create Use Plans for the Production Units (PU); and establish Community Agreements.

A lack of specific legislation, that defines the concept of environmental services and authorizes the use of public resources for this purpose, was highlighted by most of those interviewed as being an obstacle to payment for environmental services from PROAMBIENTE.

Unlike countries such as Mexico, Costa Rica and El Salvador, which have created specific laws on the topic of environmental services, in Brazil this subject has yet to be tackled. Without a law that clearly establishes what an environmental service is considered to be, who the providers and/or beneficiaries are, which providers should be directly remunerated using public resources, how much they should receive according to each type and the amount of services provided, as well as other issues, there will be no way of implementing a sustainable funding policy for payment of environmental services in Brazil.

b) ICMS Ecológico taxation (Ecological VAT on Sales and Services)

The ICMS Ecológico is a public policy instrument that was first created in State of Paraná. It deals with the transfer of financial resources to municipalities that contain Conservation Units or protected areas within their borders as well as water sources that supply neighboring municipalities.

Paraná was the first Brazilian state, in 1991, to promulgate the ICMS Ecológico Law or Law of Ecological Royalties, which is the name given to Complementary Law no. 59, dated October 1, 1991, which regulates article 132 of the state’s Constitution and provides guidelines for the distribution of funds originating from the ICMS tax using environmental criteria.
### Table 9. ICMS (Value Added Tax on Sales and Services) Ecológico

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Country</th>
<th>Location</th>
<th>Aims</th>
<th>PES</th>
<th>Beneficiaries</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991:</td>
<td>Paraná</td>
<td>Sharing financial resources by ecologic criteria.</td>
<td>Protected forests Water conservation Biodiversity</td>
<td>Municipalities with protected areas and Water sources that supply the public</td>
<td>Tax event on Goods circulation It is a state tax. States have autonomy to detinate 25% of income to municipal Conservation Units. The critic is that despite government creates more new protected areas; the designated amount is always the same what represents a weak incentive for municipalities that will receive less funds.</td>
<td></td>
</tr>
<tr>
<td>1993:</td>
<td>São Paulo</td>
<td>Tax on goods circulation, on interstate and intermunicipal transport.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995:</td>
<td>Minas Gerais</td>
<td>Tax on Comunication services and energy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996:</td>
<td>Rondônia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997:</td>
<td>Rio Grande do Sul</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997:</td>
<td>Mato Grosso</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997:</td>
<td>Pernambuco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997:</td>
<td>Amapá</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997:</td>
<td>Tocantins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The creation of ICMS Ecológico taxation is very interesting because it creates incentives for municipalities that respect certain environmental conditions in accordance with state law, but mostly because it represents the first economic instrument of environmental management in the country.

The main reason for creating the ICMS Ecológico was to compensate municipalities that showed high opportunity costs based on the existence of Conservation Units in their territory that impede them from using these areas for productive activities. Forest areas, or the so-called Conservation Units, were thought of as the impediment to the development and creation of the ICMS Ecológico, since these areas went on to create debts for the aforementioned municipalities.

Regarding conservation of biodiversity, when the states adopt their Laws, they should receive guidance from the SNUC (National System of Conservation Units); however, they should look to pass the Law concerning State Systems, with adoption of Plans from the System of Conservation Units, since the ICMS Ecológico is not in and of itself an end, but rather an instrument of means, which should not function in a stand-alone manner, but rather in conjunction with other public actions.

c) National System of Conservation Units (SNUC)

The SNUC is seen as an important advancement in Brazilian legislation regarding environmental preservation because it is made up of modern concepts concerning the human-nature relationship, granting greater coherence to environmental preservation policies, although it requires improvement in relation to the issue of compensation for environmental damages. The legislation that instituted the SNUC and, more importantly, the legislation that regulates it, introduced elements for a new type of interaction between local communities and the residents within the Conservation Units based on sustainable principles.

In addition to this advantage, the Law also increases participation of social actors in the local context.

Via the SNUC Law, the government is required to consult civil society and all of the actors involved in the process of managing the Conservation Units, such as NGOs, the private initiative regarding the type of unit to be created, limits, mechanisms for reconciling group interests, division of costs for
creating the units, and incentives for participant interaction in the management of the Conservation Units (Ramos, 2000).62

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Table 10. SNUC (National System of Conservation Units) BRAZIL

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Country</th>
<th>Location</th>
<th>Aims</th>
<th>PES</th>
<th>Beneficiaries</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980: Finding that the Conservation Units (CUs) were not sufficient for preserving biodiversity in the country.</td>
<td>Brazil</td>
<td>National</td>
<td>Maintenance of biological diversity, genetic resources and waters</td>
<td>Forest Conservation</td>
<td>Society</td>
<td>Integral Protection Units</td>
</tr>
<tr>
<td>1992: Bill no. 2.892/92, giving rise to the National System of Conservation Units.</td>
<td></td>
<td></td>
<td>Endangered species</td>
<td>Biodiversity</td>
<td>Local Communities</td>
<td>Sustainable Use Units</td>
</tr>
<tr>
<td>2007: Bill no. 266/2007, not yet passed, sets forth the need for a methodology for quantifying the negative and non-mitigatable impacts and imposes the limit to be applied to environmental compensation, through new concepts of identification, calculation and application of resources.</td>
<td></td>
<td></td>
<td>Protection of natural landscapes</td>
<td></td>
<td></td>
<td>Critics: In some cases, the agency that defines the amount of compensation is the same that receives the funding.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Environment al monitoring</td>
<td></td>
<td></td>
<td>Lack of methodology to define negative impacts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value biological diversity and ecological tourism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Protect subsistence resources for traditional communities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Some unfavourable points can also be found, such as the absence of a methodology to quantify the negative and non-mitigateable impacts and the lack of a limit to be applied to environmental compensation, making the venture unfeasible and onerous, giving the job of defining the value to be charged for implementing the Conservation Units to the public administrator (House of Representatives, Commission on the Environment and Sustainable Development, 2007).  

In addition to these aspects, the lack of resources for land title regulation, the government bureaucracy, the fact that compensation is paid by ventures that cause environmental impacts, the fact that the law establishes a minimum compensation of 0.5% over the value of the venture and does not define a maximum ceiling of compensation suggest that there is an immediate need to adopt a clear methodology for its good functioning.

d) Bolsa Floresta (Forest Stewardship Program)

The State of Amazonas represents 33% of the total area of the Amazon and contains 16% of all of the planet’s fresh water (Rocha, 2007). The Government of the State of Amazonas has proven its commitment to and has carried out pioneering initiatives aimed at preserving Amazonian biomes. A good example of this was passage of the State Climate Change Law, Environmental Conservation and Sustainable Development of Amazonas State Law no. 3.135, dated November 14, 2007, which was the first initiative geared towards cutting greenhouse gas emissions in Brazil.

The law which creates the State System of Conservation Units establishes the criteria and standards for creating, implementing and managing conservation units. At the state level, the project deals with the guidelines established by federal law that institute the National System of Conservation Units (SNUC), a clear example of the interaction between state and federal law.

According to the governor of Amazonas, this law consolidates the state’s commitment to its people, the forest, technological evolution, and the well-being of the planet. It creates fiscal and financial mechanisms to foster reduction of environmental impacts in Amazonas and establishes methods and facilities for companies to reduce greenhouse gas emissions and to compensate this impact (carbon neutralization). It also requires that the state itself set an example regarding reduction of its CO₂ emissions.

The new law creates a legal framework that goes beyond the traditional instruments of education, research and financial incentives, recognizing and enhancing the projects established by the Kyoto Protocol in order to reduce and capture carbonic gas in the atmosphere.

It further proposes carrying out carbon inventories, forest biodiversity inventories, and inventories for the various sectors of economic activity in an

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effort to identify environmental, social and economic potentialities for the state to receive investments that prioritize clean energy matrices which also favour stabilization of greenhouse gasses in the atmosphere. The Government of Amazonas has focused on the economic valorisation of the forests and believes that with this Law opens up space to establish economic (market) relationships within the environmental product that the state maintains, via carbon sequestration and other activities which prevent the disasters caused by global climate changes, all of which being an important part of the environmental services that the state provides to the world.

The payments take place according to two models of Program application; in the first case, specifically, a benefit of R$ 50.00 (U$ 31.2) per month, per family is paid, via a program card to those families that deforested areas of less than 50% in relation to the area in effect in the year that the Program was instituted. The second payment modality is through payment to the resident association of the Conservation Units and corresponds to 10% of the annual value received by all of the resident families, paid once a year following approval in a community meeting.
### Table 11. Bolsa Floresta (Forest Stewardship Program) BRAZIL

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Country</th>
<th>Location</th>
<th>Aims</th>
<th>PES</th>
<th>Beneficiaries</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007: State Decree no. 26.581, dated April 25, 2007, establishes criteria for establishing voluntary state climate change, forest conservation, eco-economic, and greenhouse gas neutralization policies and establishes other measures</td>
<td>Brazil</td>
<td>State of Amazonas</td>
<td>Create and encourage carbon credit regimes</td>
<td>Forest Conservation</td>
<td>Local Communities living in state CUs</td>
<td>Those residing for at least two years in the CU</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Environmental education</td>
<td>Biodiversity</td>
<td></td>
<td>Maintain rural production in an area not superior to the area in the year the program was instituted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Research in CUs</td>
<td>Water conservation</td>
<td></td>
<td>Children are regularly enrolled in school</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Creation of the Climate Change Fund</td>
<td>Reduction of GHG</td>
<td></td>
<td>Participate in the community’s resident association and the Use Plans and Management of the CU</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Creation of the Bolsa Floresta (art. 5, II)</td>
<td></td>
<td></td>
<td>Sign the commitment agreement and fulfill the program requirements.</td>
</tr>
</tbody>
</table>

Keeping in mind that the Bolsa Floresta Plan is relatively recent and that there are parts of the program that have not yet been implemented, it is difficult to assess the results, despite presentation of a positive assessment by academics, because it goes beyond command and control policies and is widely participative in character.
Regarding the pioneering initiatives of PES, one of the important lessons learned is the need to internalize the environment on the government agenda. The second aspect that can be mentioned is the need to clearly establish a national development plan and, within this plan, a national environmental policy with clear goals that set forth the design and methodology of federal, state and municipal public policies. This aspect needs to be broadened and requires greater integration and the formulation of regulatory frameworks that show a profound institutional renewal in relation to the processes of public management. It is equally essential that public managers at the federal, state and municipal levels have wide-ranging knowledge of public management of strategic processes for development and which, through construction of government plans, incorporate environmental criteria, establishing indicators to assess practical results.

One of the biggest hurdles for public management in Brazil is environmental management centralized in environmental agencies with no budget and without the political strength to carry out public policies within environmental criteria.

Based on what has been set forth in this paper, perhaps the most relevant aspect is the need for joint action between the planning and environmental agencies and the need to not reduce the environmental issue to an exclusively sectorial matter that is opposed to national guidelines for economic growth.

e) Water Basins Protection and the Charging for use of water resources

The National Water Agency (ANA – Agência Nacional de Águas) has also been carrying out its legal role as the regulatory body for water use at the federal level. In order to do this, ANA has set up an extensive dialog with the Water Basin Committees and other representative agencies, coherent with the integrated management model.

An important step to achieve a fully integrated system of water resources management is the system of charging for the use of water. This procedure has already been established by several state legislatures and is foreseen in Federal Law No. 9.433/97. Charging for water use, as well as for dumping untreated waste water into water bodies, is an important mechanism to stimulate the rational use of water and avoid wasting this precious resource. It is also a means of encouraging a more thorough treatment of urban sewage.

Even though we are in the 21st century, this continues to be one of the greatest sources of pollution in the Brazilian rivers, and, unfortunately, the cause of many diseases that propagate through water and mainly affect children, who are particularly vulnerable to improper sanitary conditions.

Input obtained from the mobilization and discussions on the PCJ (Piracicaba, Capivari, Jundiaí) River Basins played a very important part in the legislative acts of the State of São Paulo, as well as in the formulation of the National
Water Resources Policy Act. In 2006, the PCJ River Basins presented another very significant contribution, when they started charging for the use of water resources as the result of a management agreement among the Water Basin Committees (Federal and State), the Water and Power Department (DAEE, of the state of São Paulo), the Institute of Water Management (IGAM, of the state of Minas Gerais) and ANA, which is responsible for regulation of water under federal jurisdiction, such as the rivers of the Piracicaba River Basin, which have their sources in the state of Minas Gerais and cut across an important region of the state of São Paulo.

The extensive negotiations that took place in the PCJ River Basins to develop mechanisms and values for the charging of water use produced a rich lesson to be applied in other regions of the country that wish to implement an integrated system of water resources management.
<table>
<thead>
<tr>
<th>Timeline</th>
<th>Country</th>
<th>Located</th>
<th>PES</th>
<th>Beneficiaries</th>
<th>Relevant Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1934</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1989 The institution of the Inter-Municipal Consortium of the Piracicaba, Capivari and Jundiaí River Basin.</td>
</tr>
<tr>
<td>1989 Piracicaba, Capivari and Jundiaí River Basin Committee (CBH-PCJ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1997 The called ‘Law of Waters’ Implemented an integrated system of water resources management. Defined the National Water Resources Policy. Charging for water use, as well as for dumping untreated waste water into water bodies, an important mechanism to stimulate the rational use.</td>
</tr>
<tr>
<td>1997: The National Water Resources Policy, established by Law No. 9433/97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2000 ANA was created</td>
</tr>
<tr>
<td>2002 State Water Resource Fund (FEHIDRO)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004 Integration Convention with ANA Law n. 10.881/2004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
<td>Location</td>
<td>Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>------------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>State Law n. 12.183/2005</td>
<td>São Paulo</td>
<td>State Law instituted the charge for water resource usage in São Paulo with similar objectives to those established by federal legislation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decree n. 6.101/2007</td>
<td></td>
<td>2007 The state of São Paulo began charging for the use of water from rivers under its jurisdiction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The success case of water charge in the PCJ Basins, beginning with river basins under federal jurisdiction, represented the consolidation of a new paradigm. When a basin collectively decides to implement the water charge as a tool to manage their water resources, they are also generating funds for river-
margins reforestation, environmental education programs and other fundamental actions for the sustainability of their water (ANA Report, 2007).^{64}

5. CONCLUSIONS AND RECOMMENDATIONS

1

Brazil’s environmental policy has been generally supported on command and control instruments and despite strict environmental laws, deforestation, influenced by the hike in the prices for commodities on the international market and by the growing demand for products from agriculture and livestock, has reached extremely high levels, in a trend that will be difficult to reverse using the public policy instruments that are currently available.

In this context, the PES proposal has two very important innovations regarding conservation policy and sustainable use of the Amazon rainforest, specifically the great potential for self-regulation, taken into account the difficulty faced by agents in Brazil to monitor the forest, and the ability to create and increase the income of environmental service providers, considering the costs of opportunity.

2

In the context of Brazilian regulation, PES is seen as a way to achieve environmental policy objectives by according monetary value to the environmental services involved. Bill n. 792 of 2007, which was undergoing discussions among the Steering Committee of the House of Representatives on October 21, 2009, contains one of the most complete definitions and states that environmental services are those services that are seen as flows of material, energy and information of natural capital inventory that, in combination with built and human capital services, produce benefits for human beings. We stress here the importance of fixing a clear and effective conceptual framework and regulatory marks defining and creating efficient mechanisms for PES implementation.

By addressing governance, the multi-level political economic processes should be better explored in order to tackle with the tensions between actor’s variable interests and achieving better platforms for debate and negotiation among stakeholders to deliver sustainable development effectively. PES is an important alternative to avoid deforestation, but should not be over estimated. It must be considered in a broader and coordinated view, among many other public policies.
Forestry sector in Brazil faces serious structural problems such as non-defined landholding situation, the institutional gap between the regulatory marks and the state operational capacity to supervise and enforce laws; infrastructure deficits in technical assistance and financial resources in federal, state and municipal levels. These structural problems impacts differently the local groups that utilize the forestry resources, as settlers, extractors, river dwellers and indigenous peoples.

Current national climate change arrangements provide no enough incentives for reducing deforestation and lonely very limited incentives for reforestation and afforestation. These activities have been included under the Clean Development Mechanism (CDM) that should have simplified procedures. Although SFM and CDM provide a suitable framework for addressing issues within the forest sector, cross-sectoral approaches will also be needed.

The Amazon region’s successful experience in institutional organization shows that a practical, ideal and irreversible application of all the management tools established by legal marks depends on the synergy of all bodies and institutions.

The agroecological zoning for biofuels production can be an important reference tool for the sustainable territory planning, becoming possible to produce food, fuel and feed, without direct competition and without to pressure the protected areas. But to do so, governmental rules and incentives are basic requirements. The Brazilian experience can be adopted and adapted for countries with available areas to produce biofuels, especially some developing countries in Latin-America, Africa and Asia, located in the tropical region, which has, in general, the best natural conditions for bioenergy production.

Biofuels can be an important alternative for the sustainable development of rural areas, avoiding exodus for the urban areas, by giving job opportunities in the agricultural and industrial stages.

In fact, it is not currently viable to produce ethanol in Amazon Region, because of its long raining season and distance from the consumer market, as well as precarious infrastructure in such region, besides environmental concerns. However, this agroecological zoning is an important precaution instrument to avoid potential future risks for both the biofuels sustainability and Amazon conservation.
Projects concerning LULUCF activities had a very positive adhesion, despite the fact that difficulties related to analysis, monitoring, timing of carbon and additionality made them less competitive than other projects developed in other fields like efficient energy, cogeneration with cane bagasse; biogas in landfills; hydrofluorocarbon (HFCs) reduction, among others. Therefore, by designing new legal marks about this issue would require a revision of the strategy adopted by Kyoto. One possibility would be considering LULUCF projects externally to CDM, using autonomous boundaries to compensate targets, without direct competition between the credits from LULUCF projects and those from other CDM fields. The same approach is valid to REDD projects. Despite mechanisms for carbon credits generation are still under construction within UNFCCC, some relevant issues could be more properly addressed. For example, if the accounting of carbon credits for type of project wouldn’t be treated separately it could cause an unfair competition among the different modalities of projects, causing negative impacts on International carbon trade market.

5

The barriers to conservation of the Amazon forest are institutional, socioeconomic, economic, and ecological. They are deeply intertwined, but considering them into their principal components helps to make clear their respective importance. The institutional barriers for the conservation of the Amazon forest ecosystems comprise administrative/legal challenges and irregularities across and along scales, from the organizational to the national policy level. The analysis of the state public policies and legal framework of deforestation arch states demonstrated that the State of Amazonas has one of the most developed environmental framework focused on conservation, and Pará, Rondônia and Mato Grosso lacks legislation and public policies concerning key subjects like biodiversity and climate change.

Environmental policies should focus on enabling a better adaptation of individuals in the environment they are located, in order to improve their quality of life and encourage greater equity and social justice. Although the public agents design new policies more oriented to these objectives, many problems of implementation and functioning of policy instruments result from an inappropriate institutional structure, which has little flexibility and is very bureaucratic, or does not allow for meaningful participation and thus lack credibility.
Despite that no prices have been established, environmental services are very valuable to the well-being and the very survival of humanity, since human activities such as agriculture and industry depend on them.

The formula to implement a new financial standard for the region depends on the articulation of existing funds with new financial opportunities and new potential sources.

By providing credit mechanisms to foment projects that delivers sustainable development for economic activities in the Amazon region is strategic to invert the opportunity cost from those who deforest for not having another alternative of job and income. The states located in the arch of deforestation must promote the development of integrated economic activities promoting responsible and planned job and income policies. There are several integrated economic activities such as palm oil in zoning areas; sustainable production of rubber; reforming and recuperation of pastures lands with monitoring system of animal production and market access, among others.

There is a need to invest in capacity building in government agencies, especially those dealing with environment natural resources and finance. There is a need for a coordinated approach to capacity building at national, state and municipal level.

There is an urgent need to build the capacities of indigenous people, forest communities, and small forest owners and farmers to participate in the design and implementation of these new initiatives.

There is ample room for improvement in methods for estimating forest loss, forest degradation and carbon accounting. Scientific research is needed into the socioeconomic implications of the new concept of PES, REDD and SFM. Policymakers must have up-to-date information on the impacts of climate change.

Leaders and representatives with their higher level of technical knowledge and political experience, as well as the scientists with their studies and research are the point of contact between communities and institutions. They have a crucial role in linking all levels of stakeholders. They shall develop innovative means for improving national-local communication with information symmetry to make existing and future public polices work properly and achieve the expected results.
The old standards of familiar agriculture and extrativism must be revised and newly oriented by competitiveness to survive. Some key strategies in this direction consists in developing the cooperativism; supporting the development of small agro industries; developing the local productive scheme; adjusting the tax marks; offering credit support to modernize these sectors. The small farmers lack public policies that promote their long term competitiveness in a new market environment. Conversely, they will always need subsidies, authorization for delay of payments and market distortions to survive.

Agriculture must not be seen as a problem to the environmental conservation, but as its integral part. Agribusiness generates food, fibers, energy, timber, jobs, income and dignity to farmer citizens. Small or large producers are part of this process. All activities have their scale and, nowadays, there is not space for inefficiency in a globalized world. There is a gradual transition happening in global agriculture and environmental issues that leads them to reconcile technology, efficiency and conservation.
6. REFERENCES


Press.


Disponível no site: http://www.institutoaqualung.com.br/info_conservacao37.html


