The following is a short description of policy and research questions in the Mato Grosso case study of POLICYMIX. This page will be continually updated as the case study focus is developed. Assessments of economic instruments in their policymix in case studies will take place in 2011-2013.

1. **Introduction**

The Mato Grosso case under development will focus on a range of existing instruments and those under development associated with efforts to reduce deforestation in the Amazon biome of the state. Because Mato Grosso is the largest single source of deforestation and related greenhouse gas (GHG) emissions in Brazil, in turn responsible for a significant share of global emissions, the forces that stimulate its frontier expansion are of global concern.

2. **NATIONAL/FEDERAL LEVEL CASE STUDY**

Our analysis of the national context will focus on federal law and regulation associated with conservation of Brazil's tropical forests and efforts to reduce deforestation, with emphasis on the Amazon basin. Property rights in the region represent a complex mosaic of public and private rights, still in process of regularization. Federal requirements for forest conservation in private lands are currently the object of national debate, whose outcome is not easily predictable.

**CONSERVATION STATUS AND OBJECTIVES**

Only part of intact Amazon forest remnants, totaling about 3.5 million km² in Brazil is protected. According to 2005 estimates, in the Legal Amazon region – which includes forest and non-forest areas totaling 5.5 million km² in nine states – only about 30% of land is in private properties, while about 37% is protected in public lands, including indigenous and extractivist reserves (see map). Another one-third of the region is contested, and claims are associated with rural violence and illegality (see Table 1)
Table 1: Land tenure structure in the Brazilian Legal Amazon region

<table>
<thead>
<tr>
<th>Land tenure category</th>
<th>Percentage of total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Land</td>
<td>24.0</td>
</tr>
<tr>
<td>Public Land</td>
<td>76.0</td>
</tr>
<tr>
<td>- Public Protected Areas</td>
<td>36.6</td>
</tr>
<tr>
<td>- of which Indigenous Reserves</td>
<td>21.1</td>
</tr>
<tr>
<td>- of which under Sustainable use*</td>
<td>10.0</td>
</tr>
<tr>
<td>- of which Integrally protected</td>
<td>5.5</td>
</tr>
<tr>
<td>Land reform settlements</td>
<td>5.3</td>
</tr>
<tr>
<td>Undefined / contested</td>
<td>33.0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

100% 5.5 million km²

*Includes sustainable use protected areas such as extractive reserves (6.3%) and environmental protection areas (3.7%).
Source: Lentini et al. (2005)

2.1 Main economic instruments in use in forest/biodiversity conservation and related regulatory instruments

Private land use in the Amazon biome is regulated by the national Forest Code, whose strictures require that 80% remain under forest cover in so-called “legal reserves”. Ecological-economic zoning (EEZ) is required at the state level by the federal constitution, to provide indicative basis for allocation of credit and other public incentives. In the presence of EEZ, the legal reserve may be reduced to 50% in areas designated for productive use. Forests, whether within legal reserves or outside them, may be managed for timber and non-timber forest product extraction, subject to a federally approved management plan (recently undergoing decentralization). Fragile lands (steep slopes, hilltops, streambanks) are subject to permanent protection and cannot be used for productive purposes. Private landowners whose properties do not comply with these strictures are required to restore forests up to the required limits, or purchase land elsewhere to achieve compliance. A market for legal reserve “quotas” is foreseen.

On public lands, forests may be the subject of concessions to private enterprises, once lands for conservation and community use are set aside. Environmental goods and services generated by such concessions may be commercialized by the concessionaire, with the exception of carbon credits associated with avoided deforestation (carbon sequestration may be credited).
DEFORESTATION TRENDS

Deforestation and forest degradation have occurred since colonization in Brazil, but only since the 1970s has it reached alarming proportions in the Amazon. Deforestation in the Amazon has been largely a product of federally subsidized land settlement and colonization, combined with private cattle ranching (also subsidized until the 1980s) and public infrastructure, particularly road construction. Timber extraction, often illegal, has preceded or accompanied land clearing for agropastoral production, serving as a ready source of capital to finance this process.

Deforestation in the Amazon has been monitored by satellite annually by the federal space research agency INPE\(^1\) since the 1980s; more recent monitoring permits real time alert where land use change is in progress. Two major peaks in deforestation occurred in Brazil: in 1995, when it reached 29,000 km\(^2\) (about 0.8% of remaining forestland of approx. 3.7 million km\(^2\)); and during the 2000-2004 period, reaching 21,500 km\(^2\), peaking at 27,772 km\(^2\) in 2004 (0.78%). Deforestation rates subsequently dropped 59%, declining rapidly from 19,100 km\(^2\) in 2005 to around 12 thousand km\(^2\) in both 2007 and 2008 (< 0.4%), followed by a substantial decline to an estimated 7,008 km\(^2\) (0.2%) in 2009 (INPE 2008, 2009). The most recent decline is the basis for the government’s claim of significant progress in implementing policies to reduce its major source of greenhouse gases (GHG) emissions – deforestation in the Amazon region, and sustain that it will tend to zero as command and control policies are maintained, fundamental to Brazil’s RED position in the UNFCCC.

DEFORESTATION REDUCTION POLICIES

Prior to discussion in the realm of the UNFCCC, concern for Amazon deforestation was expressed at the 1990 summit of the G-7, and commitments made to combat its driving forces with financial support to national efforts by Brazil. The ensuing a Pilot Program for the Protection of Brazilian Rainforests (PPG7) was designed and implemented (in 1995), encompassing five main themes: Experimentation and Demonstration, Conservation of Protected Areas, Research Support, Institutional Strengthening and Learning and Dissemination. In 2002, The National System of Conservation Units Law was enacted, and with the PPG7 program’s support, Indigenous Lands, which are recognized as a major vector in biodiversity conservation in Brazil (with protected area status) increased by 38 million ha. Between 1992 to 2004, the overall amount mobilized by the PPG7 totaled U.S. $428 million, including the financial contribution of the Brazilian government (MMA, 2005\(^2\))

OUTCOMES

Despite progress in creation of new conservation units and demarcation of indigenous territories the overall fragile results of the PPG7 program are considered fragile. Divergent views exist on the development model for the nation and its rainforests. It is increasingly clear that to achieve further reduction of deforestation rates will be dependent on structural changes in socioeconomic and political motivating factors.

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\(^1\) Brazil’s National Institute of Space Research (INPE)

\(^2\) MMA/PPG7, Relatório de Progresso 2001-2004, Brasilia, Junho de 2005
In 2004, based on the PPG7 lessons, the federal government set up and successfully implemented a Plan to prevent and control deforestation. More recently, Brazil established the Amazon Fund (based on the PPG7 lessons) and launched its National Plan for Climate Change (PNMC) with particular attention to land use change and forests. Moreover, Brazil is adopting a voluntary goal to reduce total GHG emissions by 36 to 39% by 2020 compared to a business-as-usual scenario, implying an overall stabilization of emissions at the current levels, with drastic cuts in deforestation related emissions. This goal encompasses a target consistent with goals set out in the NPCC to reduce Amazon deforestation rates by 80% by 2020 compared to the 1996-2005 average (Figure 2).

However, contradictory moves still being made, with (a) persistence of rural credit programs that stimulate deforestation, especially for cattle ranching (US$ 3.5 billion invested in cattle ranching in the Brazilian Amazon); (b) large-scale infrastructure projects: The Programa de Aceleração do Crescimento – PAC (Program to Accelerate Economic Growth), bringing " politicization" of environmental licensing procedures and (c) attempts (from the agribusiness lobby) to undermine the Brazilian Forestry Code and other environmental legislation. Meanwhile, the Brazilian government has not yet adopted a clear position on this issue, pitting the Environment Ministry against the influential Agriculture Ministry and agribusiness lobby.

**FIGURE 2 – DEFORESTATION REDUCTION TARGET IN THE BRAZILIAN AMAZON, 2006-2020 (KM²)**

![Diagram showing deforestation reduction targets in the Brazilian Amazon, 2006-2020](image)

Source: Brazil’s National Climate Change Plan (PNMC), 2008

### 2.3 NEW INSTRUMENTS UNDER CONSIDERATION OR TO BE ASSESSED

The national level case study will concern itself with instruments in place and in process of development to complement the Forest Code, such as payment for environmental services and legal reserve quotas. The national REDD+ program, in process of construction, may include the adoption of such instruments to complement other mechanisms such as tenure regularization, credit restrictions and environmental licensing, as a means to ensure progress toward the goals of the PNMC. For example, the national monetary council recently excluded proprietors who had not regularized their environmental licensing from receiving further rural credit. The national
case study will also examine (with reference to the work in WP2) the legal basis and experience to date in environmental fiscal transfers, via the ICMS Ecológico.

3. STATE AND LOCAL CASE STUDY

3.1 General description of the area

The State of Mato Grosso is located in the heart of the South American continent in the Center-West Region of Brazil. With a total area of 903 thousand km², it represents 11% of Brazil’s territory. Its natural habitat is composed of three main biomes: the Amazon forest, the cerrado (savannah) and the Pantanal wetlands.

Mato Grosso is a state of relatively recent frontier occupation. Beginning in the 1970s, numerous colonists arrived from traditional agricultural lands in southern Brazil, a diversified mass of small, medium and large landowners enticed by a package of government incentives and investments. Its population now totals 2.85 million people, with an urbanization rate of 76%.

During the last decades Mato Grosso became Brazil’s largest producer of grains and livestock. Soybean production has grown at an average rate of 10% per year since 1990 and reached 17 million tons in 2008 (29% of Brazil’s production and approximately 8% of the world’s total production). During the same period, cotton production increased from less than 0.1 to more than 2 million tons (52% of Brazil’s production). Cattle herds grew by 8% annually from 1990 to 2004 and have stabilized at 26 million head – by far the Amazon’s largest herd – since then. Mato Grosso is also the largest producer and processor of timber in the Amazon, with an average annual production of 3.6 million cubic meters of logs processed in the last four years, although this production is declining as remaining stocks are exhausted.

Most of Mato Grosso’s agricultural production is directed to exports. As for soybean, European countries represent 54% of Mato Grosso’s exports, Asian countries 44% and other countries 2%. As for beef, Europe is also Mato Grosso’s main buyer with 33% of the total, while the Middle East represent 31%, Americas 26% and other countries 10%.

FIGURE 3 – MATO GROSSO’S EXPORTS BY DESTINATION

Source: IMEA, 2009
Beside this export-oriented agribusiness sector, Mato Grosso also has a large number of family farmers, most of whom were settled through public agrarian reform projects. The situation of the settlements is quite different for large and medium farmers. Despite efforts to improve the distribution of land, the settlements are mostly excluded from the benefits of the agricultural growth of the state. More efficient public policies are essential to bring these economic benefits to the settlements. As a result of the world’s growing demand for Mato Grosso’s products, the state has been one of Brazil’s fastest growing economies. Its GDP amounted to R$ 42 billion in 2007, an 11% growth (in real terms) over 2006. Agriculture, forestry and livestock account for approximately one third of Mato Grosso’s GDP and are considered the main drivers of the state’s economic growth.

Conservation objectives

In parallel to the expansion of agriculture and livestock production, despite considerable productivity gains, large areas of forests and cerrados were converted into pasture and crop lands during the last decades. Mato Grosso’s agricultural and livestock production currently occupies 335 thousand km², which represents 37% of the state’s area (Figure 4). More than 55% of these areas were deforested after 1990.

The demand for agriculture land is expected to continue increasing strongly in the next decades. Only about one-third of expected output growth in Brazilian soybean production is expected to come from yield improvement, while global demand is expected to continue growing strongly in coming decades (FAO, 2009).

All these factors tend to increase the value of land and the opportunity costs of conserving standing forests. For example, average land price in Brazil’s Center-West region increased by
47% over the 2007-2010 period, despite the global economic crisis. The average opportunity cost of not deforesting one hectare of remaining forests in Mato Grosso is estimated to be approximately US$1,500.\(^3\) It will take strong efforts and investments in productivity enhancement to maintain the growth trend of agricultural and livestock production in Mato Grosso without further deforestation.\(^4\)

In addition to deforestation, forest degradation is a growing concern in the Brazilian Amazon and especially in Mato Grosso. In recent years, deforestation rates have declined but forest degradation rates have not. This might be related to the growth of forestry activities with still poor forest management practices.

### 3.2 Main ecosystem services under evaluation

The importance of Mato Grosso’s forest ecosystems for provision of global, regional and local environmental services varies with the scale of analysis. At a continental scale, the region is important for the production and transport of humidity to the southeast of Brazil and neighboring countries, essential for productive agriculture there (the “flying rivers” hypothesis; (TEEB , 2010)). While this hypothesis may be valid, its valuation is well beyond the scope of this project. The state is also strategically located within the Amazon and Paraguay basins, containing some of the principal headwaters that provide water for hydroelectricity and transport to downstream areas, estimated to provide as much as 20% of all water sources in Brazil. Valuation however will focus on more localized biodiversity and carbon stocks rather than regional or continental hydrological flows.

The region is particularly important as a transition zone between different biomes, from the cerrado to dense Amazon rainforest, creating a phytogeographic mosaic of great complexity and value both in preservation and in use. Its use values in the intact state are particularly prized by indigenous and traditional communities, whose knowledge of remaining biodiversity is threatened both by acculturation and deforestation. However, there are also important market values associated with both current and potential use of forest resources whose development depends on investments in social capital, local enterprise and national/international market penetration. Opportunity costs are associated with timber extraction and forestland conversion, to a combination of smallholder shifting agriculture and ranching, although there are considerable potentials for agroforestry and low impact agroextractive systems, which may be compatible with REDD+.

### 3.3 Main actors/stakeholders

Mato Grosso has 15% of its area protected in 68 Indigenous Areas and 4% protected in 73 Conservation Units.\(^5\) It also has 386 smallholder settlements covering 5% of its territory.\(^6\) The

\(^3\) Net Present Value of the 30 year cash-flows from converting one hectare of forests (not including cerrado areas) into pastures for cattle raising or crop land for soy production, considering a 5% per year discount rate

\(^4\) In fact, there has been considerable investment in the livestock industry, but this investment has been aimed at increasing the herd instead of intensifying productivity. Up to 2010, BNDES, the federal economic development bank had disbursed US 9.09 billion toward the cattle industry - $3.5 billion in loans and $5.68 billion in equity. Another US 1.42 billion was pledged to Marfrig (a Brazilian beef packer) to fund its purchase of the American corporation Keystone Foods. Source: <http://www.tmabrasil.org/pt/artigos-e-noticias/noticias-na-midia/285-aposta-de-r-185-bilhoes-do-bndes-em-frigorificos-assusta-concorrentes>

\(^5\) Federal, State and Municipal Conservation Units, including the Natural Private Reserve category (Reserva Particular do Patrimônio Natural – RPPN), but not including the Environmental Protection Area category (Área de Proteção Ambiental – APA) that encompasses mostly private properties.
remaining area, which corresponds to 77% of the state’s territory, is mostly occupied by medium and large private properties. Approximately 30% of this area is already registered in the SIMLAM system, Mato Grosso’s environmental registry for rural properties (Table 2, Figure 5). Besides direct land users, other stakeholders include equipment and input vendors, transport providers and processing industries, such as slaughterhouses and food processing. Commercial agents also play an important role in rural settlements. Policymakers and government agencies are also key stakeholders in the direction of incentives and instruments adopted.

Table 2 – Land tenure status in forest and non-forest areas in Mato Grosso

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of areas #</th>
<th>Forest area km² '000</th>
<th>Cerrado and Pantanal area km² '000</th>
<th>Total area km² '000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous Lands</td>
<td>68</td>
<td>89 17</td>
<td>45 12</td>
<td>134 15</td>
</tr>
<tr>
<td>Conservation Units</td>
<td>73</td>
<td>21 4</td>
<td>12 3</td>
<td>33 4</td>
</tr>
<tr>
<td>Official smallholder settlements</td>
<td>386</td>
<td>30 6</td>
<td>12 3</td>
<td>43 5</td>
</tr>
<tr>
<td>Other (mostly private properties)</td>
<td>~ 100,000</td>
<td>386 73</td>
<td>308 81</td>
<td>694 77</td>
</tr>
<tr>
<td>Registered in SIMLAM</td>
<td>10,700</td>
<td>126 24</td>
<td>81 21</td>
<td>206 23</td>
</tr>
<tr>
<td>Not yet registered in SIMLAM</td>
<td>~ 90,000</td>
<td>260 49</td>
<td>228 60</td>
<td>488 54</td>
</tr>
<tr>
<td>Total</td>
<td>526</td>
<td>100</td>
<td>377 100</td>
<td>903 100</td>
</tr>
</tbody>
</table>

Sources: Simlam (Sema-MT), 2009; Incra, 2009; Prodes (INPE), 2008 (ICV Analysis)

FIGURE 5 – LAND TENURE STRUCTURE IN MATO GROSSO

Sources: SEMA, MMA, INCRA (ICV Analysis)

6 Not including the settlements that are not yet demarcated, nor other areas of consolidated smallholder agriculture
3.4 Main economic instruments in use in forest/biodiversity conservation and related regulatory instruments

MATO GROSSO’S ECOLOGICAL ECONOMIC ZONING (ZSEE)

Zoning has been required since 1990 by the Federal government in the nine states that compose the Legal Amazon. State Ecological-Economic Zoning (ZSEE) is an instrument of territorial planning with the objective of influencing decisions of public and private actors regarding the use of natural resources, and balancing maintenance of natural capital and ecosystem services with economic activities. The spatial distribution of economic activities under ZSEE takes into account the limitations and fragilities of ecosystems, establishing restrictions and alternatives to territorial expansion of their exploitation.

In Mato Grosso, the ZSEE document was presented by the executive to the legislature in the first half of 2008, designating several restrictive uses and new protected areas, giving vent to a series of 16 regional public hearings. A sizeable social mobilization occurred, marked by heated debates that expressed diverse political and ideological positions. This mobilization was an exercise of popular participation marked by a test of forces between social and environmental movements – usually the minority in these hearings – and those mobilized by agribusiness interests.

In the final stage of public consultation, the State Assembly worked behind closed doors with a technical commission responsible for devising the proposed bill for State zoning for the second half of 2009. The greatest challenge now is to make this process, marked by ample debate among civil society participants, a valued reference for this final stage. The greatest concern is that sectors such as agri-business that hold greater representation in the Assembly will look out for their own interests over other sectors' positions presented and debated in the public consultations. The role of socio-environmental institutions is fundamental to bringing society documented information regarding the relevance of implementing the ZSEE.

MATO GROSSO’S DEFORESTATION REDUCTION POLICY

With the decentralization of forest governance, the Amazon states have played an increasing role in the country’s efforts to reduce deforestation. Especially, Mato Grosso, which accounted for 39% of the total deforestation in the Brazilian Amazon region during 1996-2005, with an average of 7.7 thousand km² per year, has taken bold actions to improve forest governance and curb deforestation. For example, it has implemented a pioneering environmental licensing system for rural properties, which allows for a better control over deforestation. In nine years of implementation, 23% of the state area located in private areas (see table 2 above) are monitored by this SIMLAM system. Since 2006, it more than doubled the staff of its environmental agency and strongly increased field enforcement operations. In parallel to this, deforestation has decreased to an annual rate of 2.8 thousand km² during 2006-2009, a 63% reduction. Mato Grosso contributed with some 59% of the deforestation reduction that took place in the Brazilian Amazon over the past four years.

In order to sustain further reduction in deforestation, Mato Grosso launched in November 2009 its own Plan to prevent and control deforestation and fires and adopted a target to reduce deforestation rates by 89% by 2020 compared to 1996-2005 (Figure 6). This target represents more than 60% of the national target for deforestation reduction in the Amazon, and approximately 40% of Brazil’s total goal of GHG emission reduction by 2020.
These figures demonstrate the expressive scale of Mato Grosso state’s challenge within the context of Brazil’s international commitments to reduce GHG emissions.

**FIGURE 7 – DEFORESTATION REDUCTION TARGET IN MATO GROSSO, 2006-2020 (KM²)**

Source: Mato Grosso’s state Plan to prevent and control deforestation and fires (PPCDQ-MT)

**MATO GROSSO’S DEFORESTATION REDUCTION PLAN**

Mato Grosso’s action plan to prevent and control deforestation and fires is composed of an integrated set of programs organized in three areas:

- **Land use planning**: sanction and implement the state zoning plan; legalize rural properties’ land tenure and compliance with environmental laws; and consolidate the system of state conservation units, implementing the existing reserves and creating new ones, according to the state zoning;

- **Monitoring and control**: monitor and report on forest governance through indicators; prevent forest fires and tackle illegal burning practices; and strengthen law enforcement through field operations and improved judicial efficiency;

- **Incentive to sustainable activities and economic instruments**: implement Payment for Environmental Services; define sustainable criteria for financing agriculture and agroindustry; strengthen training and technical assistance and promote productivity increases, best practices and certification in the agriculture and forestry sectors; and induce sustainable development in rural smallholder settlements.

Among these actions, one of the most important is the "Legal Mato Grosso" (MT Legal) Program, also officially launched in November 2009. This program will promote the regularization of land tenure and environmental compliance of rural properties in the state, through the registry of rural properties into the state environmental licensing system. The MT Legal aims to accelerate through tax incentives the registration of private properties in SIMLAM. With the MT Legal program, it is expected from the government that most of the state’s properties will be registered in the next three years.
The "Ecological Value Added Tax" (ICMS Ecológico or ICMS-E, according to May et al., 2004), as implemented in Mato Grosso, adheres to the same legal underpinning of the instrument as adopted in other states of the federation, namely the national constitution: 25% of the portion of state value added taxes due to municipalities may be allocated according to formula at the state's discretion. This discretionary clause allows states, including Mato Grosso, to allocate a proportionally small but significant share of the proceeds from such taxes (which are levied at 17% of all goods and services transactions internally and 12% on interstate transactions), to those municipalities which have allotted part of their land area to conservation units. The allocations are based on formulae which vary between the states. In Mato Grosso, different from other states, indigenous areas are included in the calculation, which for some municipalities cover a substantial proportion of their area.

Currently, of 141 municipalities existent in Mato Grosso, 86 are benefitted with revenue increments from this source. For the principal beneficiaries, the increased amount varies between 10% and 60% of their prior allocation. The majority of municipalities receive only a fraction of this.

The value currently transferred is based on the simple result of the sum of protected areas and indigenous territories, multiplied by their respective weighting factors by category of protection and divided by each municipality’s area. However, the instrument is currently being refined to qualify the return to municipalities to benefit the ones that have superior performance of quality indicators, considering protected areas’ status and socio-ecological performance. The value of the quality-based transfer is expected to increase or decrease the amount of ICMS-E up to 5%. An evaluation system will allow this percentage increase or decrease, encouraging municipalities to improve efforts on the quality of their protected areas and resident indigenous peoples.

### 3.5 New instruments under consideration or to be assessed

#### PROPOSED REDD MECHANISM

In the context of the international climate change regime, today it seems possible to mobilize resources and adopt instruments able to guarantee a strong and sustainable reduction in Amazon deforestation. This can be done through the implementation of a program for the Reduction in Emissions from Deforestation and Forest Degradation (REDD). The implementation of REDD can be employ a combination of command and control instruments and economic instruments.

At the same time, the State offers important preconditions for the implementation of the REDD mechanism: appropriate instruments for the environmental licensing of rural properties, its own institutional structure for regulation of forest management, a relatively well established land tenure situation, and wide support from Government, civil organizations and economic sectors.
### TABLE 3 – ESTIMATE OF EMISSIONS REDUCTION FROM DEFORESTATION IN MATO GROSSO, 2006-2010

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deforestation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (km²)</td>
<td>7,657</td>
<td>7,657</td>
<td>7,657</td>
<td>7,657</td>
<td>7,657</td>
<td>38,285</td>
</tr>
<tr>
<td>Actual and targeted</td>
<td>4,333</td>
<td>2,678</td>
<td>3,258</td>
<td>2,000</td>
<td>1,500</td>
<td>13,769</td>
</tr>
<tr>
<td>deforestation (km²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction (km²)</td>
<td>3,324</td>
<td>4,979</td>
<td>4,399</td>
<td>5,657</td>
<td>6,157</td>
<td>24,516</td>
</tr>
<tr>
<td>Emissions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>reduction (MtCO₂)</td>
<td>122</td>
<td>182</td>
<td>161</td>
<td>207</td>
<td>225</td>
<td>897</td>
</tr>
</tbody>
</table>

Sources: Mato Grosso Action Plan to Prevent and Control deforestation, PRODES/ INPE (IPAM Analysis)

Considering a minimum price of US$ 5.00 / tCO₂e, the total amount potentially available for this program is estimated at US$ 1.1 billion, to be invested during 2011-2015.

REDD funds are considered a unique opportunity and a necessity to achieve the plan's ambitious targets. There is now a widespread awareness about the opportunities linked to a REDD mechanism, and the relevant stakeholders including the government, the agriculture and forestry sectors, many indigenous communities and part of the family farming sector, along with the environmental NGOs, are defending the implementation of REDD at the state level as a key strategy to achieve lasting deforestation reduction without sacrificing the state’s economy.

As a result, several REDD pilot projects of different types are under preparation. In parallel to this, the state is trying to develop a basic REDD framework as part of the California-led Governor’s Climate and Forests (GCF) task force, expecting to be able to issue REDD credits in the coming years. And state-wide public policies for different sectors (such as a compensation scheme for landowners who maintain forests in excess of the 80% "legal reserve" requirement) are starting to be discussed.

However, these efforts lack coordination – with the strategies proposed in the state plan to control deforestation, between projects and state-level initiatives, as well as with other states in the region and with the process at the federal level. In this context, it is essential to structure rapidly the state REDD system, including an adequate regulatory, institutional and technical framework, and to develop state-wide policies for the different economic sectors/ stakeholder groups involved based on the strategies developed at the local, project level.

Developing the REDD system consists in establishing the regulatory, technical and institutional framework for the REDD activities in the State: developing the REDD law and regulations, as part of the state Climate Change policy; establishing principles, criteria and procedures for the registration and/ or certification of REDD projects and state-wide, sector-specific programs; defining the state baseline, carbon accounting and insurance systems, in agreement with the requirements of future regulated carbon offset markets; designing the instrument to serve as future REDD credits to be issued by the state; and defining the functions to be carried out to manage this REDD system and the roles to be performed by the different institutions that will take part in it and the governance mechanisms for these institutions.

Developing the REDD programs consists in designing the specific actions to be implemented in state-wide, sector-specific programs in order to reach the deforestation reduction target. Such programs should include: i) a compensation scheme for private landowners who conserve forests in excess of the 80% legal requirement (Private Forests Program); incentive mechanisms
for increasing productivity of agriculture and cattle ranching (Agriculture & Livestock Program); a compensation and sustainable development scheme for Indigenous Peoples (Indigenous Peoples Program); a sustainability package for smallholder settlement farmers (Family Farming Program); a program to increase and effectively implement the state protected areas (Protected Areas Program), among others. The development of these programs should be based on the experiences of the pilot projects – however some of them, such as the Private Forests Program, might start earlier since its basic instrument (the environmental licensing system of rural properties) is already in place.

The implementation of Mato Grosso’s REDD mechanism will be managed by the State Climate Change Forum, established in October, 2009, which is composed of representatives of the State Government and Civil Society organizations and the different stakeholder groups involved.

In March, 2010 the REDD working group in the State Forum on Climate Change was created. This Forum is the legally established participatory group that will develop the state policy on climate change, and has the participation of over 40 institutions representing all the relevant stakeholder groups. The REDD working group is responsible for preparing proposals on the REDD theme, considered the main challenge and opportunity in terms of Climate Change policy in Mato Grosso. This working group has more than 20 participants, including representatives of most of the institutions in the Forum, but also from various experts from different government, non-government and private-sector institutions, with different backgrounds, geographically and thematically.

The working group's first priority is to develop a REDD law proposal, which should be concluded by the end of November 2010. The next steps will include developing the law’s regulations (once the law is passed by the State Assembly) and to design the REDD programs mentioned above. In parallel, the group will produce a new, revised version of the State REDD Plan document, which will be used within the context of GCF and for fund raising.

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4. NORTHWEST REGION OF MATO GROSSO

The northwest region of Mato Grosso is located in what is called the Amazon Arc of Fire, a region characterized as a tropical forest frontier and equivalent in area to the entire country of Panama (10,762,290 ha). The region contains a complex and dynamic socio-economic system as well as an extensive area of native forests covering 8,616,970 ha. Indigenous territories cover 38,600 km² and are home to six indigenous peoples belonging to three different language groups. Four "uncontacted" isolated indigenous peoples are also located in the region. In this sparsely populated area (1.4 inhabitants/km²) approximately 38% live in rural areas, with 11 agrarian reform settlements covering 3% of its area. The presence of these communities is crucial for the conservation of the region's biodiversity.

7 Not including the settlements that are not yet demarcated, nor other areas of consolidated smallholder agriculture.
of the State is limited, and, as a result, major land conflicts are known to occur. The region is composed of seven municipalities: Aripuanã, Castanheira, Colniza, Cotriguaçu, Juína, Juruena, and Rondolândia. This is the most active land-use frontier in the world, accounting for nearly half of all tropical forest loss during 2000-2005, but more than 80% of forest cover (86 thousand km² of its original 104 thousand km² of forest still remain. Approximately 31% of its forested land is protected in 11 indigenous areas and 4% protected in 9 reserves. The remaining area, which corresponds to 62% of the region’s original forested land, is mostly occupied by medium-large private properties.

Site description

Forestry and cattle ranching are the major economic activities, and the ones leading to deforestation. Agriculture is less expressive and mainly directed to subsistence activities or to the local market. Population migration in recent years from other regions in Mato Grosso and from neighboring Rondônia State and subsequent pressure for settlement areas, together with land speculation and illegal occupation of land, are other drivers of deforestation and degradation. Similarly to other frontier areas, in the Northwest region intensive legal and illegal forestry exploitation without adequate techniques leads to forest degradation, which is subsequently followed by fires, clearance and conversion to pastures.

In recent years cattle ranching activities have expanded rapidly in Mato Grosso State with a 30% growth in cattle herd between 2000 and 2007. This expansion also reached the Northwest region, which in 2007 had more than 2.1 million head of cattle, more than twice as much as in 2000. Juína is already ranked high on the list of municipalities with the largest cattle herd in Brazil. This growth is expected to continue due to the substitution of pasture by intensive agriculture in other regions of the State.

Cattle ranching in Mato Grosso is performed in different land holding sizes. Small landowners concentrate on calf production, whereas large landholders focus on suckled calves and range fattening. Meat is processed either in Juína or is sent to neighboring cities. Two new slaughterhouses are under construction and, once active, are expected to triple meat processing in the region. Most of the meat produced in the Northwest is exported to other Brazilian states or to other countries. Land use surveys in Juína and Cotriguaçu revealed a current gross income of U$ 100.ha.year⁻¹ for cattle ranching, that attains U$ 300 where the cattle raised is for mixed purposes (meat and dairy).

Timber exploitation is centered in the municipalities of Colniza, Aripuanã and Cotriguaçu, but timber extraction in the region decreased in 2005 following a large command-and-control operation, and the area under sustainable forest management has increased since then (Figure 9). Timber extraction fraud is still frequent though: timber stocks tend to be overestimated in forest management plans and the exceeding timber is supplied by pirate loggers who extract high value wood from public and private areas or indigenous lands.

A study done by Imazon (Monteiro et al, 2008) assessed illegal logging in the Northwest region of Mato Grosso and found that only in 2007 a total of 483 km² were illegally logged, 86 of which inside protected areas and indigenous land. It also identified in the region more than 30 thousand km2 with high potential for sustainable forest management and concluded that the region has the potential to supply the local timber industry if a well-implemented policy can be adopted to assure that those areas will be managed sustainably. However, the success of this policy will require incentives to increase the engagement of landowners on Improved Forest Management practices, as well as the commitment of the forestry industry to buy only products from areas that are being managed and are certified.
FIGURE 9 – DEFORESTATION, CATTLE RANCHING AND SUSTAINABLE FOREST MANAGEMENT IN NORTHWEST MATO GROSSO, 1998-2008

Sources: PRODES, SEMA, IBGE

Note: The area under Sustainable Forest Management is only available since 2006, when the state environmental agency implemented an integrated system to control forestry activities.

2001-2010: the GEF/UNDP/SEMA project

Financed by the Global Environment Fund (GEF) for the period between 2001 and 2010, the venture is being implemented by the United Nations Program for Development (UNDP) and the Mato Grosso State Government through its Department of Environment (SEMA-MT). It aims to promote alternative land use systems and territorial environmental management for the purpose of subsidizing public policies aimed at balancing socio-economic development with biodiversity conservation. Targets for the last project cycle (2009-2010) included: (a) $1.78 million to consolidate the activities related to the mosaic of Protected Areas and Ecological Corridors; (b) $476,000 for promotion and consolidation of sustainable agriculture and agroforestry activities in private areas; (c) $39,000 for the management of low impact forest timber production. Also, $2.6 million were raised by twelve additional projects being developed in six of the region’s seven municipalities over the 2007 to 2011 period. These projects are coordinated by eleven different local partner organizations including five municipal governments, two indigenous associations (Zoró, Rikbaktsa), and three associations of private colonists and agrarian reform settlers.

Besides this large social-ecological network, practical results include parameters and indicators for refining and consolidating Ecological Economic Zoning at the municipal level. Ongoing studies are revealing that innovative farmers participating in the project shows less deforestation per person/ha (11.5% below their municipality’s average); more preserved forest cover (53% average); fewer cattle per capita (50% average) and greater Gross Domestic Product per capita (51% average). The project helped to improve data and methods established for the management of the Meridional Mosaic of Protected Areas of the Amazon; and invested in non-timber forest production (mostly Brazil nut and rubber latex), helping to manage 760,000 ha of...
forest on two Indigenous areas and one agrarian reform settlement (out of eleven). The demonstrative efforts in farmer’s and indigenous organization helped to attract more than $1.5 million of public investment obtained from Banco do Brazil’s Rural Sustainable Development Fund through the Intermunicipal Consortium for the Development and Preservation of Environmental and Socio-economic activities in Juruena’s Valley in Mato Grosso Legal (MT-Legal) Program. Concerning the timber industry, the project helped to consolidate a pioneer Forest Stewardship Council (FSC) management certificate for Rohden Lignea SA (29,000 ha of certified forest under management). The overall results and its social network supported the choice for the region as one of two sites in Brazil to host a REDD Pilot Project, which is described below.

REDD Pilot Project

Following efforts to assess the opportunities and challenges for implementing REDD in Mato Grosso (Micol, Andrade, Bonner, 2008) and a feasibility study led by TNC, the Northwest region of Mato Grosso has been pointed out as a top-priority area for curbing deforestation through a large-scale, multi-stakeholder REDD experiment. While the REDD pilot represents in itself an important piece of the State Government’s strategy to reduce deforestation and forest degradation, it should also serve as a basis for the design of other REDD projects in Mato Grosso and inform the global negotiations on a future climate change regime.

In this project outline, the ICV briefly present the project area, institutional design and agenda, at this preliminary stage of the project’s development.

**Project phase 1: Cotriguaçu and Juína municipalities**

**Cotriguaçu**

Given the broad extension of the project area and challenges associated to this task, a REDD pilot project will focus during a first phase on a priority municipality, Cotriguaçu, (Figure 10). Its diversity of land tenure categories (protected areas, indigenous lands, rural settlements and private lands) provides an ideal scenario for a demonstrative REDD project through the implementation of a range of strategies. At the same time, we will work on preparing the other municipalities for the second phase of the project, mainly by promoting land registry and environmental compliance.
Project strategy

In order to assure a sustainable reduction in deforestation and forest degradation rates, we will adopt a strategy composed of three main components: i) improvement of the governance of forests in the region; ii) incentives for forest conservation in private lands; and iii) guarantee of a compensation for indigenous and other traditional peoples and for local rural communities (small farmers settlements).

- **Strengthen forest governance**

  The improvement of forest governance is widely acknowledged as a fundamental piece of a REDD strategy. On the one hand, poor governance is appointed as one of the major underlying causes of tropical deforestation; on the other hand, strong governance is considered key to make the implementation of economic incentives possible.

- **Provide incentives for forest conservation in private lands**

  It is essential to provide effective incentives for forest conservation in private lands, since these areas account for 89% of the accumulated deforestation in the region, and they hold 56% of its forest remnants (and current carbon stocks).

  In order to promote forest conservation in private lands in the project area, we will implement combined incentives for the conservation of forests remnants, the development of sustainable forest management and the intensification of cattle raising in already deforested areas. These incentives will include a financial compensation scheme based on the carbon markets, and the dissemination of sustainable practices through training and demonstrative areas.

- **Compensate indigenous and other traditional and rural communities**

  The participation of indigenous and other traditional people as well as of smallholder communities is another key component of the proposed REDD program. Indigenous and other traditional peoples’ lands represent 32% of the region's total area, but due to their very low accumulated deforestation (<1%), they hold 39% of the region's forest remnants. Thus, they have a fundamental role in conserving biodiversity and carbon stocks in the Northwest of Mato Grosso. The rural settlements of small farmers, on the other hand, represent only 3% of the total area of the region, but they account for 9% of the total accumulated deforestation and sustain more than five thousand families (close to 50% of its rural population). This population is also an important stakeholder to be included in the region's REDD program.

  In order to promote the continuous protection of the forest remnants in these areas, we will support the participatory design and implementation of specific programs for the indigenous and other traditional people and for the smallholders located in rural settlements in the region. A case study for reforestation and agroforestry impacts of the GEF project on economic and ecological indicators will be under way in 40 sites (farms) in the municipality of Juína and 20 more in Cotriguaçu. The aim of this case study is, besides developing parameters and indicators for better land use practices, is to subsidize a Voluntary Carbon Market project. The participants will be two groups of farmers, consisting of agrarian reform settlers and private colonists, both small landholders, under the 100 ha category. As these private farms and settlements are part of the protected areas’ and Indigenous Land's buffer zones, the project will be complementary to other PES and REDD initiatives for CUs, Indigenous Lands and/or bigger landholders initiatives, as presented.
These two initiatives (GEF project, REDD pilot) are naturally complementary, but were designed from different perspectives and must face institutional and governance challenges. The GEF project, after a start emphasizing forest management, forested pastures and protected areas, and in a smaller scale AFS, experienced a major change of direction in 2005. A major command and control intervention in 2005 moved governance from the federal agency (IBAMA) to a state agency (SEMA); deforestation trends showed the need to regroup the project’s strategies and resources around Indigenous Lands, that were integrated into project’s strategies. AFS and NTFP strategies gained force as ways to alleviate deforestation pressures on proposed buffer zones. By 2007, the overall results were positive, but the project lacked consistent information on ecological and economic impacts. After a series of exploratory studies, ecological and economic indicators were assessed and consolidated, databases were formed and a consistent social network is motivated.

Connecting these two initiatives and their stakeholders is, indeed, an institutional challenge for SEMA, ICV and UNDP, not to mention the necessary engagement of the municipalities, rural organizations and indigenous organizations that can provide the necessary governance for such enterprise.

**Economic instruments to be evaluated on site**

**ICMS ECOLÓGICO**

Payment for environmental services is central to the REDD strategies and has provided return taxes to the municipalities by percentage of Protected Areas in the state of MT. The value is currently transferred according to the simple result of the sum of PA and IT, divided by the municipality area. However, the instrument is currently being refined to qualify the return to municipalities to benefit the ones that have superior performance of quality indicators, considering the Protected Areas status and social-ecological performance. The quality evaluation is expected to increase the value of the transfer by up to 5% and an evaluation system will allow this percentage increase or decrease, encouraging municipalities to make efforts to improve the quality of their Protected Areas and in the livelihood of peoples that inhabit their buffer zones and indigenous reserves.

**Potential equity effects:** Between 2004-2008, the political leadership of the indigenous Zoro people (Rondolândia) succeeded, through debate and vote in municipal legislature, to direct US $78 thousand in ICMS Ecológico program revenues toward the preparation of a Management and Supervision Plan of their Indigenous Territory, in order to reduce and control illegal logging. By contrast, the Rikbaktsa culture group, without the same capacity for resource mobilization at the municipal level via legislation, has received less than $ 20 000 over an eight year period.

**PROGRAM FOR MINIMUM PRICING**

Another instrument to be evaluated will be the federal Program for Minimum Pricing (of Brazil nut and Rubber látex), which is increasing local prices of these NTFPs, stimulating farmers and indigenous people to keep forests (for harvesting of Brazil nut and latex), and also increasing the demand for seedlings of these species in order that they be planted in biodiverse AFS that will occupy former pastures or slash-and-burn plots.
ECOLOGICAL ECONOMIC ZONING (EEZ)

Ecological Economic Zoning (EEZ) for the area of study provides that areas within zoning Subdivision 1.1.b - should prioritize the implementation of agroforestry systems in small and medium farm units, encourage appropriate forest management in larger properties, and encourage other activities that do not involve vegetation cover change. Once the zoning law is approved we will monitor the implementation of the economic instruments so as to recommend guidelines for the region.

THE ENVIRONMENTAL LICENSING OF RURAL PROPERTIES

The ICV in partnership with The Nature Conservancy will support the environmental licensing of rural properties in the municipalities of Juina and Cotriguaçu. This work has as main objective to bring landowners toward environmental legality. The farms that have a deficit of forest cover will have to establish a restoration plan or environmental compensation on another property to comply with the Law. This paper will be developed during 2011 and will play an important role in the pilot REDD strategy.

Ecosystem services focus on site

The area is considered extremely high biodiversity (PROBIO, 2001). Main ecosystems targeted for ecosystem services providing carbon and biodiversity, along with the intrinsic knowledge of the indigenous and traditional populations inhabiting these forests. The Ministry of Environment, through the PROBIO project, considered that the area of the municipality of Cotriguaçu requires: creation of environmental protection units, biological inventories, anthropological studies and an environmental education program.

Innovative farmer’s land use were assessed for Juina and Cotriguaçu sites, showing for biodiversity services the importance of (a) existing forest cover on the property and surrounding area and (b) the size and structure of the AFS (including their biodiversity) in terms of fauna sighting and observation of alimentation and reproduction.

Biomass and Carbon Stocks in private areas of forest management.

- Above Ground Live Biomass 310.6 t/ha
- Coarse wood debris and standing dead wood 31.6 t/ha
- Coarse root biomass 65.2 t/ha
- Total above ground carbon stocks: 195.6 tC/ha

Biomass and carbon stocks in Agroforestry Systems

In terms of C stocks, 12-14 year old AFS on innovative farms showed values similar to pioneer forests of the same age, and conservative projections show up to 100 T/ha in a 30 year cycle. Forests stocks in private lands (primitive but logged forests) showed a range from 162 to 98 T/ha. Values of biomass stocks reached up to 201.6 m³.ha⁻¹ in AFS managed for more than 12 years. As our C estimates in smallholders private lands did not not measure or estimate either roots or the whole litter and dead wood (which represents 31% of the biomass) the values for AFS and in their logged forests (not planned timber management) are conservative. Even so, the best average (162 tC/ha for a smallholder logged forests) presents a variation of only 16% compared to the values found for private planned forest management.
**Biodiversity, AFS and forest remnants**

- Tree diversity in AFS reached 54 vascular species, against 87 in forest fragments (Gonçalves, 2009);
- Sightings of wildlife were reduced (≤ 20 sp) for private lands (cases) where AFS and forest were 1km or more apart. Even larger areas of forest inside the farm did not affect these values, reinforcing the general assumption that lack of connectivity is critical for wildlife presence in AFS.

**Analytical approach and methods**

Quantitative methods for conducting impact evaluation will be adopted, making use of data contained in GIS, landscape level databases, as well as data at the level of farm land use.

GIS-based 'matching' techniques and counterfactual analysis will be adopted for forest cover evaluation. Comparative analysis will also help to understand similarities and diversity in the impacts of different institutions and policies on both command and control and economic incentives, concerning common conservation aims (forest cover, deforestation rates, and ecosystem services indicators). To find similar (and overall effective) strategies to improve economic performance of more sustainable land use systems is another aim of this approach.

However, the ongoing study will face the challenge of integrating, within the same analysis, the roles and impacts of a wide diversity of institutions (federal, state and municipal governments and several foreign cooperation projects).

The central analytical framework is provided by Ostrom (2007), with the SES (Social Ecological Systems) approach. Some of the micro variables that influence impacts and processes of land use change at the farm level have been measured in previous studies to evaluate their interactions with agrobiodiversity conservation (Vivan et al., 2009).

Within a scenario of multiple institutions engaged in actions which offer some synergy but also sometimes conflict, an institutional analysis would be necessary. The point will be to understand how rules, the biophysical environment and the nature of the community are interacting for the observed outcomes, an approach that is related to a parallel approach championed by Ostrom – IAD (Institutional Analysis and Development - Ostrom, 2005).

The decision making scenario is currently dominated by analysis that follows Hardin's dichotomy of panaceas: conservation by command & control enforced by state and federal institutions, or total liberalization: letting farmers privatize and decide autonomously about the region's forest cover and biodiversity future. Clearly a middle road is necessary.

To achieve the projected results this case study will incorporate data from different research efforts (CIFOR, SEMA/ICV) and UNDP/GEF project monitoring systems reports and case studies. The overall study is expected to be a breakthrough in environmental policy analysis concerning the Brazilian Amazon, with its major novelty being the adoption of an integrated multiscale analysis. It will include ecological, economic and institutional aspects, and will offer to policy makers an adaptive mix of environmental policy strategies and tools (Jiggins & Röling, 2002).


ICV (2009) Reference document for the development of Mato Grosso’s state REDD program. ICV, Cuiabá.


PROBIO (2001) Áreas Prioritárias para Conservação, Utilização Sustentável e Repartição de Benefícios da Biodiversidade Brasileira, MMA/SBF:Brasília, 144 p


