

The Amazon is suitable for forestry, and the creation of new States can lead to increased deforestation in the Brazilian Amazon

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Introduction

THE MOST pressing issues related to the conservation of biodiversity in the Brazilian Amazon are linked to large-scale losses of critical forest functions vis-à-vis the continuous advance of agricultural, livestock and logging frontiers, as a consequence of deforestation.

In 2011, the cumulative deforestation area in the Brazilian Legal Amazon was close to 743,000 square kilometers in 2011, the equivalent of 19 percent, most of it concentrated along the so-called Deforestation Arc, whose borders stretch to the South-East of the State of Maranhão, the North of Tocantins, the South of Pará, the North of Mato Grosso, Rondônia, the South of Amazonas and the South-East of the State of Acre (INPE, 2011).

One of the great challenges to the sustainable conservation of the Amazon is determining whether the protected areas, even with low implantation, represent an effective instrument to guide public policies on the fight against deforestation in that region (Aaron et al., 2001).

Ferreira et al. (2010) report that one of the ways to attempt to restrain the loss of biodiversity, natural resources and environmental services in the Brazilian Amazon is to have territorial planning instruments.

In recent years, Ecological-Economic Zoning (ZEE) has been the Brazilian government's proposal to contribute to decisions on the social, economic and environmental planning of the development and use of the national territory on a sustainable basis. The ZEE Program targets zoning at different levels

of data treatment and its subsequent integration into planning systems, at all levels of public administration (Ferreira et al., 2010).

In this sense, the ZEE becomes an important instrument in supporting the formulation of territorial policies for the federal, state and municipal governments, guiding the different levels of decision-making on the enforcement of policies that are consistent with the guidelines of the country's strategic planning. It therefore seeks to maintain the region's natural capital and reduce investment risk.

The State of Pará houses a rich diversity of ecosystems and some of the greatest biological wealth in Brazil. However, along with the States of Mato Grosso and Rondônia it is responsible for more than 80 percent of deforestation in the Legal Amazon in the past 10 years (INPE, 2011).

Today, around 249,000 square kilometers have already been deforested, accounting for 22 percent of the total area of the State, leading the federal government and state governments to propose policies to reduce this deforestation process. One of such policies was the establishment of the Ecological-Economic Zoning of the State of Pará, which was completed in 2010 (Ferreira et al., 2010).

A new occupation policy is being currently implemented in the Amazon, based on proposals to divide the current states of the Legal Amazon that may contribute negatively to the implementation of public policies either consolidated or under implementation.

In recent years, there have been recurring proposals for the territorial division of the State of Pará, since the National Constitutional Assembly of 1988 created not only the States of Mato Grosso do Sul and Tocantins, but also decided on the need to create new States in the Brazilian Amazon. Nevertheless, the creation of new States in the Amazon may lead to increased deforestation in the area, especially where agricultural and mining activities are intense, like in the State of Pará.

The proposed division of the State of Pará into three new States - Pará, Carajás and Tapajós - would change completely the spatial configuration of the Region and negate one the most important public policy instruments operating in the State, i.e., the ecological- economic zoning, thus leading to increased deforestation.

This study compares the changes on the protected and deforested areas and their representativeness, considering the proposed division of the State of Pará.

Methods

Data collection

The information plans used in this study were: (1) boundaries of the municipalities in the legal Amazon (IBGE, 2005); (2) boundaries of Indigenous Land Conservation Units in the Legal Amazon (IBAMA, 2011); (3) deforestation in the Legal Amazon, Satellite Monitoring of the Brazilian Amazon Forest (PRODES) (INPE, 2011); (4) boundaries of the Ecological-Economic Zoning of the State of Pará (2010).

Data Analysis

The information plans were analyzed in the 3.3 Arcview Geoprocessing Software (ESRI, 2006).

Results and discussion

Deforestation in the State of Pará

Presently, 20 percent of the State of Pará is deforested. However, considering the forest areas analyzed alone, this proportion increases by 22 percent, excluding the classes covered by non-forests, e.g., the *Cerrado* vegetation, not analyzed by the PRODES project, and the State area covered by rivers and lakes (Figure 1).

Despite extensive deforestation and the fact that it is one of the states that contributes the most to the whole process, in the last ten years there has been a clear tendency towards a decline in deforestation both in the Legal Amazon and in the State of Pará. (Figure 2).

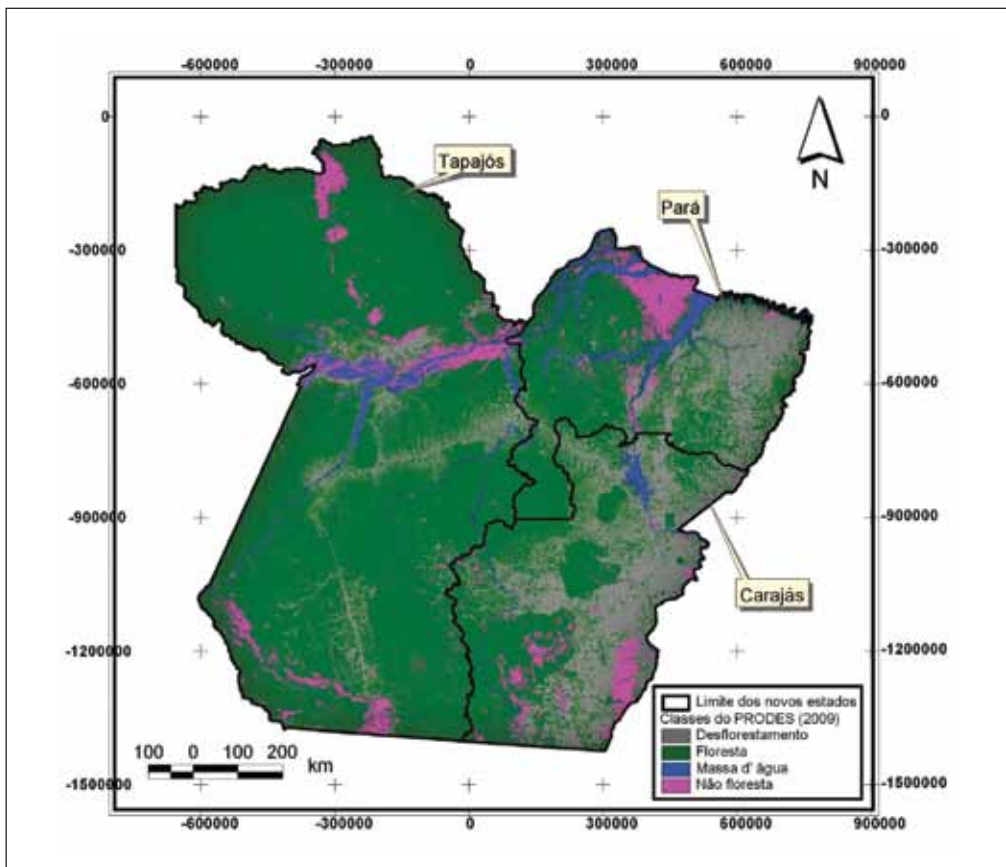


Figure 1 – Classes of vegetation coverage in the State of Pará. The boundaries shown here are based on the proposed division of the State of Pará.

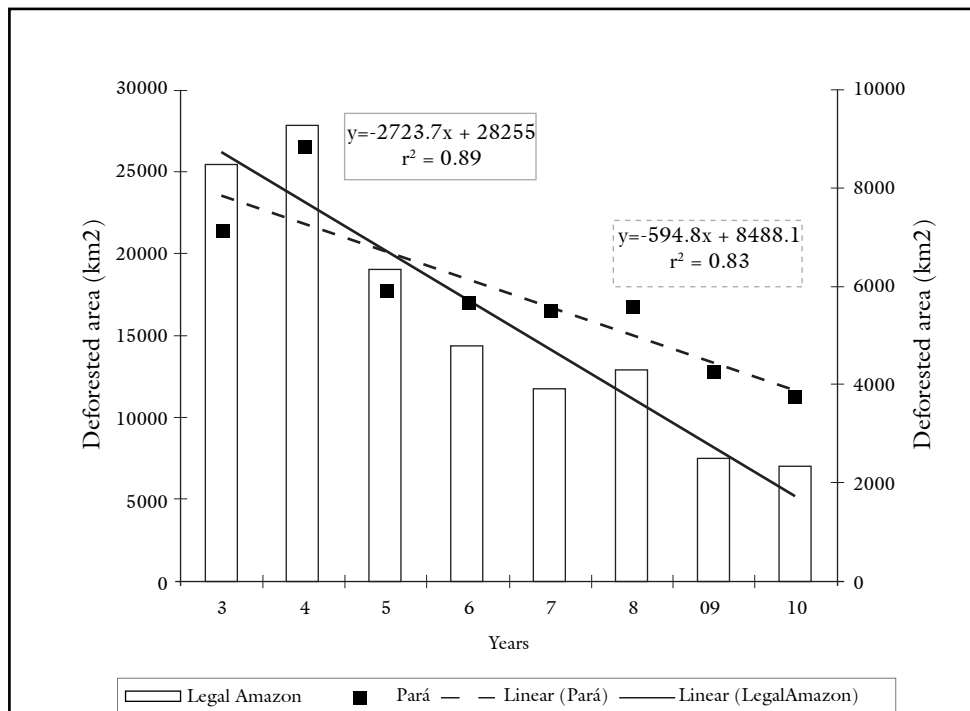


Figure 2 – Significant reduction of deforested areas between the years 2003 and 2010 in the Legal Amazon and in the State of Pará

This came as a result of effective control and surveillance policies by both the federal and state governments, such as the establishment of the forest district in the region along the Cuiabá-Santarém (BR 163) and PA 275 highways, which intended to link the town of São Félix do Xingú to BR 163 and establish a mosaic of integral protection and sustainable use conservation units.

Protected areas in the State of Pará

There are presently 118 protected areas under federal, state and local jurisdictions in the State of Pará, totaling 56 percent of the entire State area. Of these, 16 are formed by groups of integral protection conservation units (10.1 percent of the total areas) and 50 by the group of sustainable use units (22.1 percent). There are 52 indigenous reserves and a military zone, accounting for 22.8 percent and 1.7 percent of the State area respectively (Figure 3).

Several studies have shown the effectiveness of conservation units, indigenous reserves and other protected areas in preventing deforestation in the Deforestation Arc in the Brazilian Amazon.

Nepstad et al. (2001) have demonstrated the inhibiting effect of Indigenous Reserves and Integral Protection Conservation Units in curbing the destructive process in the Deforestation Arc in the Brazilian Amazon.

Ferreira et al. (2005) have demonstrated that deforestation in the States of Mato Grosso and Rondônia has always been higher outside than inside these

protected areas, and this difference varies from 10 to 20 times between states. The largest difference is found in the State of Pará.

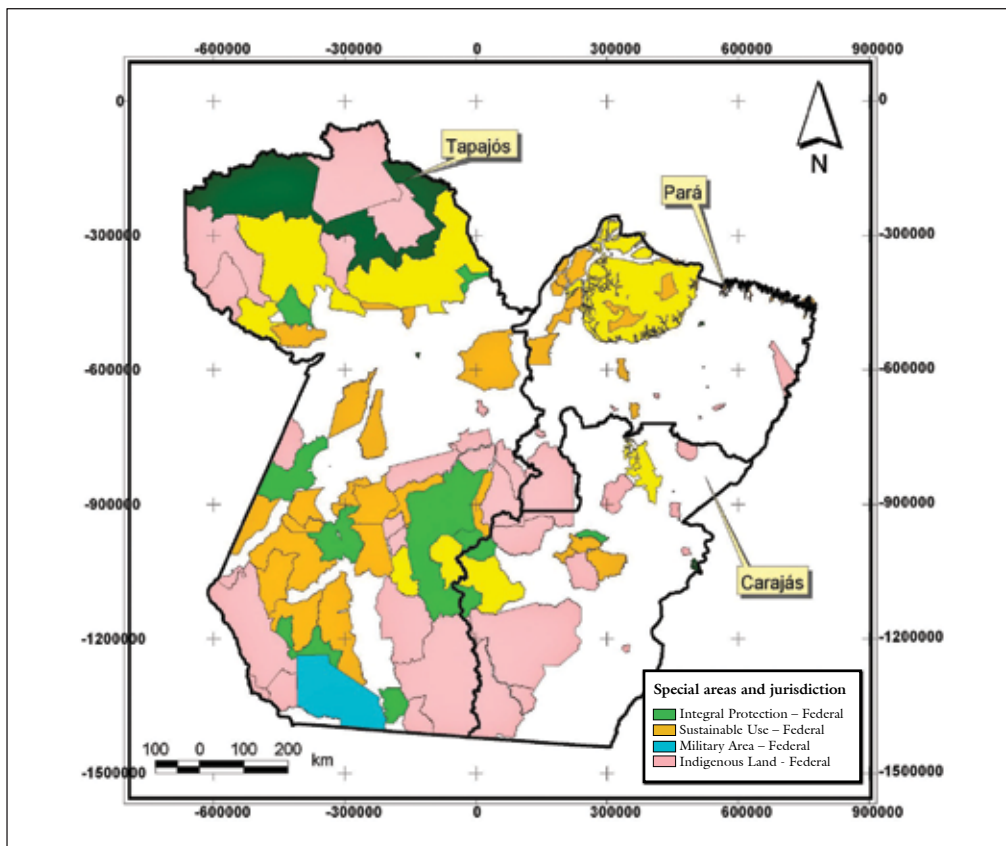


Figure 3 – Federal and State Conservation Units, Indigenous Reserves and Military Zone in the State of Pará. The boundaries shown relate to the proposed territorial division of the State of Pará.

Ferreira et al. (2010) have demonstrated that deforestation was lower inside than outside conservation units and indigenous reserves, in relation to the distance from roads in a stretch of BR 163 highway (Cuiabá-Santarém) in the State of Pará, therefore evincing the clear effect of these protected areas in curbing deforestation.

Deforestation in the States proposed in the division of the State of Pará

Three new States will be considered in this analysis as regards the intended division of the State of Pará into the states of Novo Pará, Tapajós and Carajás.

Under the new configuration, the States of Novo Pará and Carajás have a proportion of 33 percent and 47 percent of deforested areas respectively (Figures 4 and 5), which is significantly higher when compared to the State of Tapajós - 8 percent (Figure 6).

The largest proportions of deforested areas in the first two states are related to an earlier occupation of those areas along the Bragantina zone (East of

Belém) and the occupation process along federal highways Belém-Brasília and BR 230 (the Transamazônica highway) and state highway PA 150 in the territory of Carajás.

The most significant changes in deforestation patterns are perceived when deforestation in the three States proposed is analyzed, excluding deforestation inside and outside the protected areas.

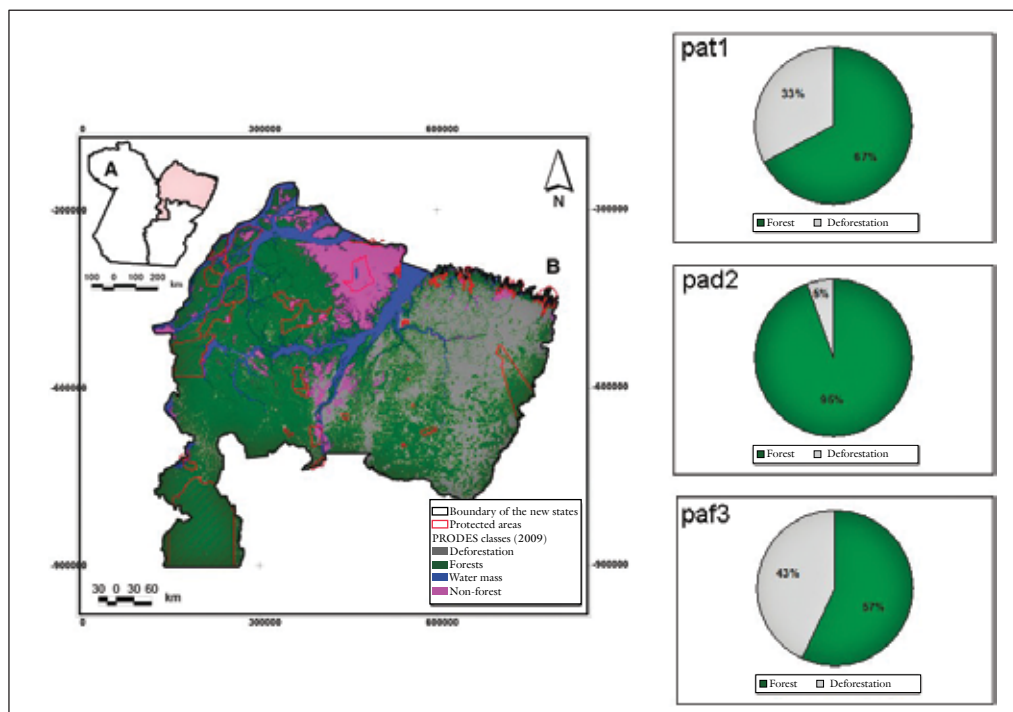


Figure 4 – Classes of remaining vegetation cover in the State of Pará, showing on the right-hand side the proportion of forest and total deforestation (pat1) inside (pad2) and outside (paf3) protected areas. The boundaries shown relate to the proposed division of the State of Pará.

In the State of Novo Pará, deforestation is only 5 percent inside and 45 percent outside protected areas, i.e., 8.6-fold increase. The same results are seen in the State of Carajás, where the variation between deforestation inside and outside protected areas is 9 percent and 67 percent respectively (Figure 5). In the State of Tapajós, inside and outside protected areas the numbers are 2 percent and 28 percent respectively (Figure 6).

The increase in deforestation outside protected areas shows clearly the importance of the current mosaic of conservation units and indigenous lands in curbing deforestation in the State of Pará.

One of the main problems resulting from the creation of the new states with the division of Pará will be the redistribution of protected areas. The State of Tapajós, for instance, would have 74 percent of its territory within the Con-

servation Units and Indigenous Reserves, while this proportion will be reduced to 32 percent and 36 percent in the territories of Pará and Carajás respectively (Table 1).

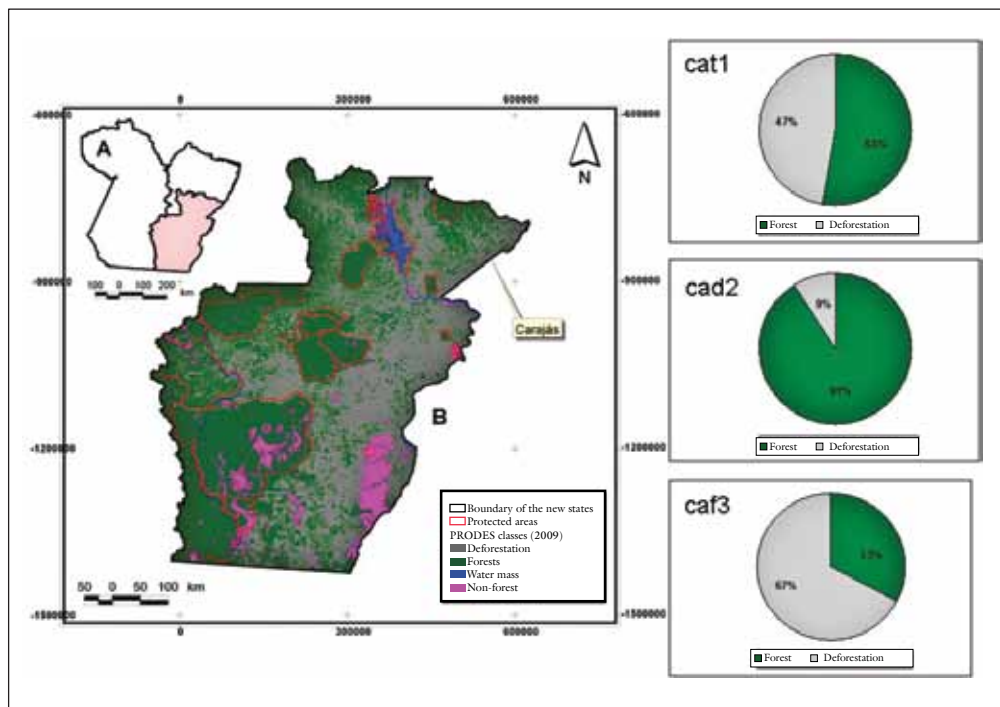


Figure 5 – Classes of vegetation cover in the State of Pará, showing on the right-hand side the proportion of forest and total deforestation (cat1) inside (cad2) and outside (caf3) protected areas. The boundaries shown relate to the proposed division of the State of Pará.

In the State of Tapajós, this new spatial configuration of protected areas is worrying, since 74 percent of the new state's territory would be officially protected, which may lead to a review of the limits of the present conservation units, in special those under state jurisdiction, which total 13.7 million hectares (11.9 percent of the total area of the proposed territory). (Figure 3).

This could occur, since with the creation of the new states the Ecological-Economic Zoning of the State of Pará (ZEE-PA) would no longer exist. In the ZEE-PA proposal, 65 percent of the State area is earmarked for the preservation and conservation of natural resources, the so-called preservation zones, and 35 percent for the expansion and consolidation of productive activities, known as consolidations zones (Figure 7).

If created, these new states would need to start a whole new zoning process, which could lead to setbacks in the successful ZEE-PA conservation policy. The new proposal for the Ecological-Economic Zoning of the State of Tapajós could, for example, suggest the reduction or elimination of the conservation

units under state jurisdiction, thus increasing the pressure for occupation in previously protected areas.

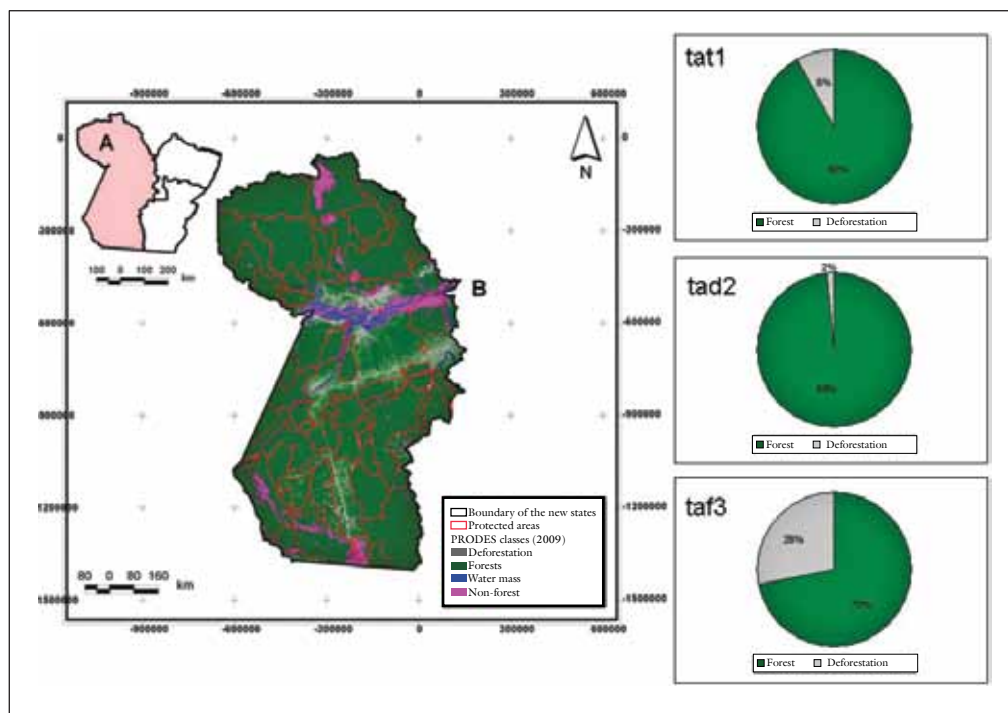


Figure 6 – Classes of vegetation cover in the State of Tapajós, showing on the right-hand side the proportion of forest and total deforestation (tat1), inside (tad2) and outside (taf3) protected areas. The boundaries shown relate to the proposed division of the State of Pará.

In this scenario, the entire Calha Norte region in the State of Pará would be within the limits of the State of Tapajós (Figure 8). In this particular region there are presently four conservation units under federal jurisdiction, six under state jurisdiction and five indigenous reserves, totaling some 21.7 million hectares of protected areas (Table 2).

One of the concerns associated with the proposed creation of the State of Tapajós is to determine the fate of the six conservation units under State Jurisdiction, which total about 12.7 million hectares, or 58.5% of the total protected areas in the Calha Norte region (Figure 8, Table 2).

Two of these conservation units, ESEC Grão-Pará and REBIO Maicuru, have approximately 4.2 million hectares and 626 hectares, respectively, of integral protection conservation units, a category of conservation unit established for the preservation of natural resources, research and public visitation (Figure 8).

Table 1 – Total area and proportion of the area occupied by conservation units, indigenous lands and a military area among the states proposed in the division of the State of Pará

Management classes	States proposed	No. of protected areas	Total area(ha)	% Area
Integral Protection	Carajás	4	612,065	2.1
Indigenous Reserves	Carajás	14	7,193,481	25.3
Sustainable Use	Carajás	6	2,315,492	8.1
	TOTAL	24	10,121,038	35.6
Integral Protection	Pará	1	5,719	0.0
Indigenous Reserves	Pará	13	1,737,033	7.1
Sustainable Use	Pará	22	5,981,840	24.5
	TOTAL	36	7,724,593	31.7
Military Are	Tapajós	1	2,157,153	3.0
Integral Protection	Tapajós	11	12,019,300	16.7
Indigenous Reserves	Tapajós	25	19,595,555	27.2
Sustainable Use	Tapajós	21	19,291,808	26.8
	TOTAL	58	53,063,816	73.8

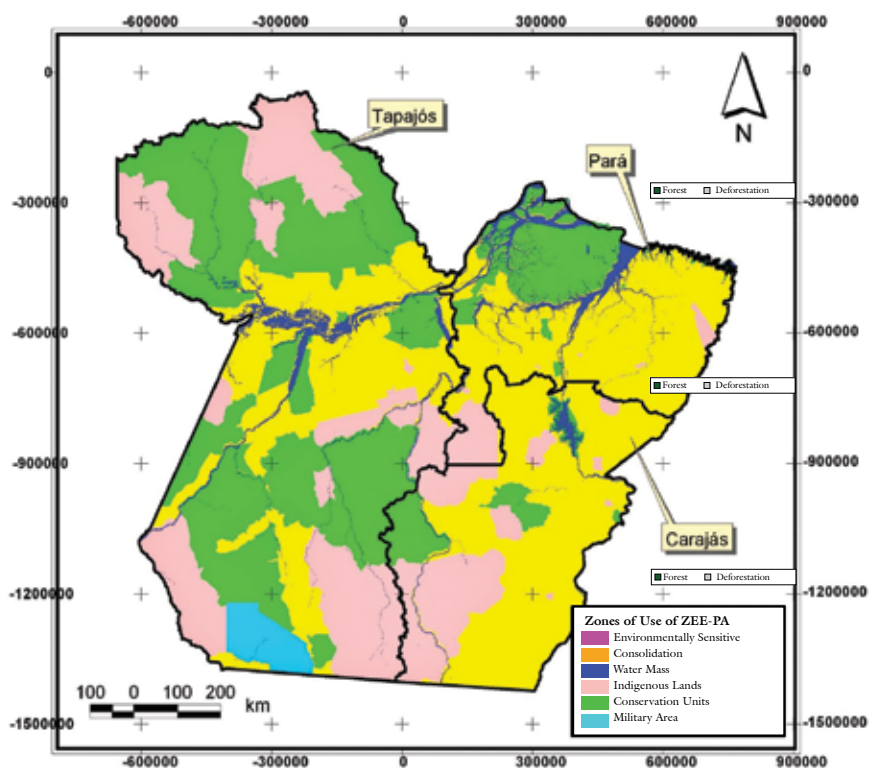


Figure 7 – Indicatives of land use in Ecological-Economical Zoning in the State of Pará. The boundaries shown relate to the proposed division of the State of Pará.

Table 2 – Name, management classes, category, jurisdiction and total area of conservation units at federal and state level and Indigenous lands in the Calha Norte region, State of Pará that will be included in the proposal for the creation of the State of Tapajós.

No.	Name	Management class	Category	Jurisdiction	Total Area (ha)
1	ESEC Grão-Pará	Integral protection	ESEC	State	4,199,120
2	PE Monte Alegre	Integral protection	PARE	State	5,933
3	REBIO Maicuru	Integral protection	REBIO	State	1,149,209
4	FLOTA Faro	Sustainable Use	FLOTA	State	626,400
5	FLOTA Parú	Integral protection	FLOTA	State	3,604,336
6	FLOTA Trombetas	Integral protection	FLOTA	State	3,136,821
TOTAL					12,721,820
1	ESEC Jari	Integral protection	ESEC	Federal	163,834
2	REBIO – Trombetas River	Integral protection	REBIO	Federal	409,185
3	TI Nhamunda-Mapuera	Indigenous Land	TI	Federal	818,970
4	TI Tumucumaque Indigenous Park	Indigenous Land	TI	Federal	2,989,860
5	TI Paru d’Este River	Indigenous Land	TI	Federal	1,194,557
6	TI Trombetas-Mapuera	Indigenous Land	TI	Federal	2,139,713
7	TI Zo’é	Indigenous Land	TI	Federal	668,798
8	FLONA de Mulata	Sustainable Use	FLONA	Federal	215,483
9	FLONA de Saracá-Taquera	Sustainable Use	FLONA	Federal	441,279
TOTAL					9,041,679

ESEC = Ecological Station; FLOTA = State Forest; FLONA = National Forest; PARE = State Park; REBIO = Biological Reserve; TI = Indigenous Land

Studies conducted by researchers from the Emilio Goeldi Museum in the State of Pará in the two conservation units for the management plan thereof, identified several endemic species in the areas, thus indicating their great biotic importance.

The Calha Norte region is extremely important to the conservation of the Amazonian biota, since it is part of a corridor of protected areas stretching from the State of Amapá to the borders of the States of Amazonas and Acre (Figure 9).

This Corridor is formed by 52 protected areas totaling more than 56 million hectares, of which 14 are protected areas in the State of Pará, with a total of 24 million hectares or 42.4 percent of the overall corridor area (Figure 9).

The extinction of state conservation units in the Calha Norte Corridor will cause a failure in its connectivity, which may jeopardize its importance in the movement of the biota, as it will increase deforestation pressure on the region.

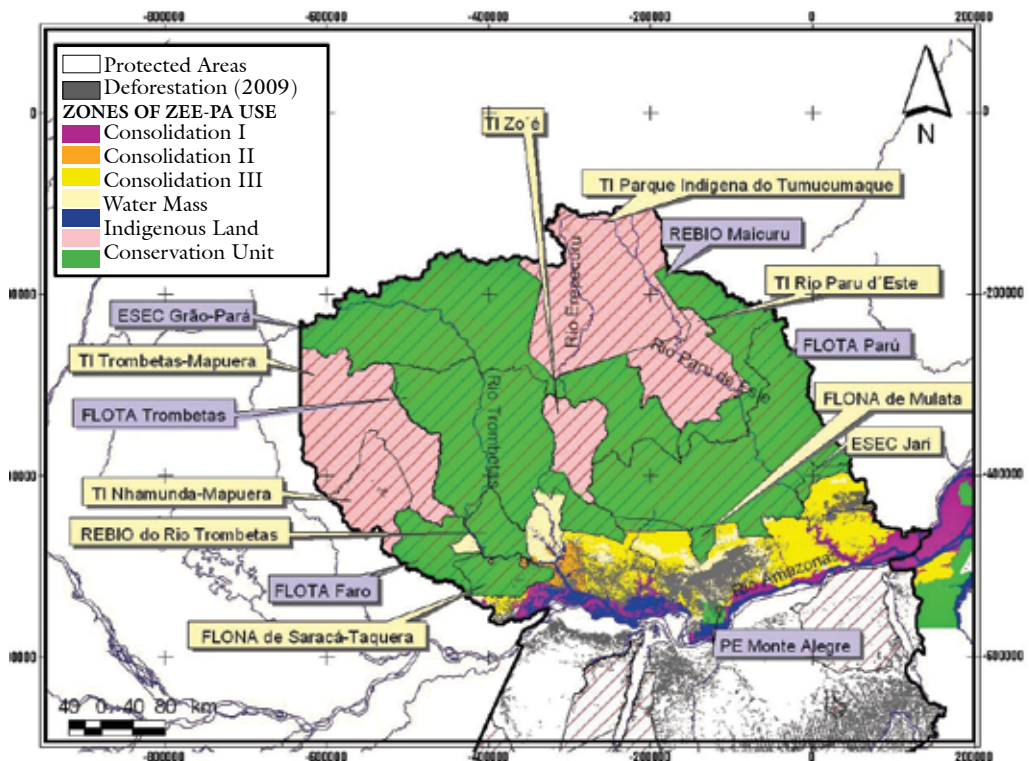


Figure 8 – Space distribution of the conservation units at federal and state level and indigenous reserves in the Calha Norte region, State of Pará, which will be included in the proposed creation of the new State of Tapajós, in relation to indicatives of use of the ecological-economic zoning of the current State of Pará.

Hüttl et al. (2001) and Fearnside (2005) report that deforestation is the type of change in land use which, in the long term, has the most serious effects on climate conditions due to large greenhouse gas emissions.

It is believed that the consequences of these changes are not limited merely to the Amazon, as they also affect both adjacent and distant regions (Correia et al., 2006).

Nobre (2001) reports that a decrease in rainfall in the Amazon followed by periods of drought may increase considerably the forest's susceptibility to fire, leading to the extinction of species that are less tolerable to drought, and therefore altering the structure of ecosystems.

The corridor of conservation units and indigenous lands in the northern corner of the Amazon should be consolidated within the scope of vast landscape corridors formed by conservation areas with different levels of protection. This concept of land use planning has been gaining steam in Brazil (Ayres et al., 1997).

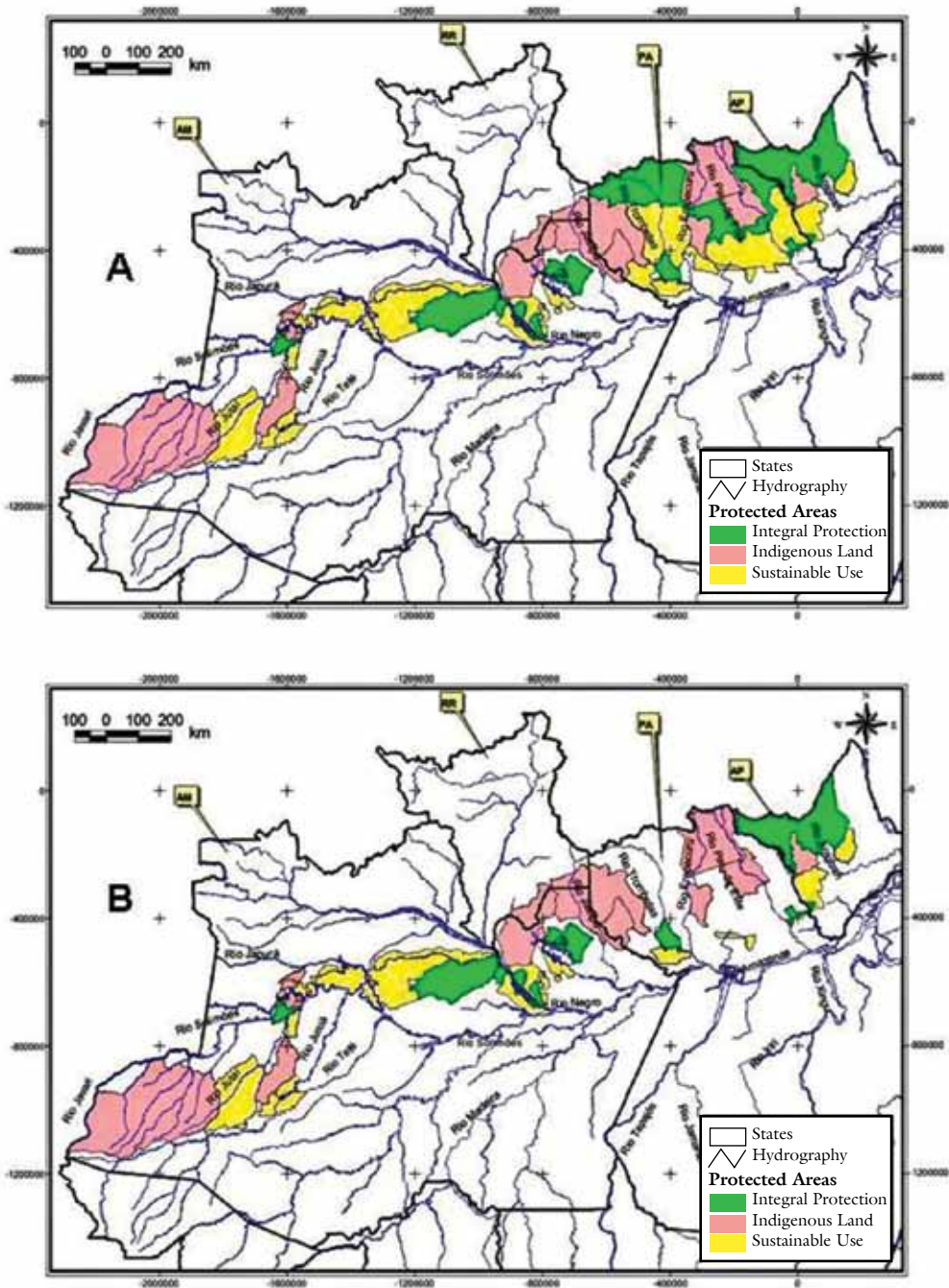


Figure 9 – Corridor of protected areas between the States of Amapá, Amazonas, Pará and Roraima (A), whose connectivity will be disrupted should the conservation units under state jurisdiction be eliminated under the proposed creation of the State of Tapajós.

It is definitely time to grab the opportunity and show a new vision for the conservation of the Amazon, in tune with the new century (Peres, 2005). The creation of new States in the Legal Amazon must be preceded by studies

that involve a detailed assessment on the environmental, social and economic impacts resulting from the separation of the original state. One of the most serious consequences of ignoring this caveat will be the creation of a legal vacuum that will be used to increase pressure on the natural resources of the Amazon.

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ABSTRACT – The state of Pará has a rich diversity of ecosystems. However, it is one of the states that contribute the most to Amazon deforestation. Currently, 22% of the state is deforested. A new policy of occupation is being studied for the Amazon, based on the creation of new states. The creation of new states can increase deforestation in the Amazon, especially in regions where the agricultural frontier and mineral activities are intense, such as the state of Pará. This study compares the changes in the representativeness of protected areas and deforestation, considering the proposed division of the State of Pará in three new states. The creation of new states can lead to a reduction or elimination of the protected areas, resulting in the increase of deforestation. Another serious consequence of the creation of new states will be the extinction of the Ecological-Economic Zoning of Pará, an important instrument of public policy. The creation of new states must be preceded by studies involving the evaluation of environmental, social and economic variables. One of the most serious consequences if this is not taken into consideration will be the creation of a legal vacuum that will be used to increase pressure on natural resources in the Amazon.

KEYWORDS: Amazonian, Deforestation, Protected areas.

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