

## **Roads, conservation and governance: lessons from the BR-163 regional planning process**

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### ***Abstract***

Road infrastructure in the Amazon has been the product of government responses to specific national and international demands of market integration. However, the impacts of such investments have promoted large scale deforestation, displaced local populations, affected regional ecosystems, and promoted social inequality. In fact, the decoupling of macro-economic goals and local economic benefits can obstruct regional development. Local participation in the planning of transportation infrastructure can enhance governance and guarantee the positive influence of government investments within local societies and their regional ecosystem. The planning process of the BR-163 highway in the Central Amazon is an example of how the decisions made by civil society contributed to reducing the gap between macroeconomic goals and local societal needs. This paper describes the main socioeconomic groups involved in the BR-163 paving debate, as well as, documents the steps that were taken to design the regional planning process for building this major Amazon road corridor. This process included capacity building and empowerment of civil society to promote its participation in the regional development and planning. As a result, civil society organized to demand local governance and economic integration from the government, which responded by creating an official government plan for the BR-163. This plan strongly addressed the unstable land tenure situation in the region by developing regional zoning to halt land grabbing and illegal deforestation and guaranteed the rights of the land to the local population. Although these steps toward governance promoted large scale conservation, it is still insufficient for promoting the development of local economies.

### **Introduction**

Infra-structure investments, mainly through road building, were one of the most important elements of national development policies for the Amazon region during the seventies (Mahar 1989; Schmink and Wood 1992; Browder and Godfrey 1997; Becker 2001). In the past, opening roads in apparently inhabited areas in the core of Amazon attracted people from all over Brazil seeking free land and resources (Hecht and Cockburn 1989). The geopolitical and macro-economic strategies used by the Brazilian Government to settle the territory and alleviate poverty in other parts of the country allowed the

agricultural frontier to move from the South and Northeast of Brazil to the interior of the Amazon rainforest (Schmink and Wood 1992; Browder and Godfrey 1997). Despite the assumption that such investments would bring economic and social development to the region, the disappointing historical results of such investments were widely contested and broadly documented (Hecht and Cockburn 1989; Mahar 1989; Schmink and Wood 1992; Browder and Godfrey 1997; Carvalho *et al.* 2001). Road building in the Brazilian Amazon has been one of the main vectors of extensive deforestation: 80% of deforestation is found along the main federal roads that cut the region (Alves 2002).

Amazon deforestation is not only a product from road building. The paving of a seasonally untrafficable Amazonian highway, can also completely change the landscape configuration and relationships between the socioeconomic groups and the natural resources (Carvalho *et al.* 2001; Chomitz and Thomas 2001; Nepstad *et al.* 2001; Carvalho *et al.* 2002). On one hand, road paving ensures access to natural resources, increases land values, and gives incentives for migration. On the other hand, this type of infra-structure investment tends to accelerate exploitation of natural capital through forest conversion and logging activities, resulting in large scale deforestation and forest impoverishment (Nepstad *et al.* 2001; Soares-Filho *et al.* 2004). In addition, road paving tends to increase social impacts and poverty promoted by the displacement of traditional populations, intensive migration, and unequal distribution of the benefits. The BR-163 highway (or Cuiabá-Santarém) in the central Amazonia has experienced such changes (Nepstad *et al.* 2002; Alencar *et al.* 2004). Three decades after its opening, the eminent paving of this road represents not only a connection between regions, but a return to the federal government agenda as one of the main investments for the Amazon, whose main objective is to decrease the transport cost for soybean produced in the center of Mato Grosso state, the number one state in soybean production in Brazil (Ministério do Planejamento Orçamento e Gestão 2003; Grupo de Trabalho Interministerial 2005).

It is possible that the development promoted by the BR-163 paving follows a path similar to other areas in Amazon characterized by poor governance and activities of fast growth and immediate and concentrated return, such as illegal logging and extensive ranching (Walker and Homma 1996; Faminow 1998; Margulis 2003). These types of activities tend to promote land concentration and avoid management practices, using natural resources as the “boom-bust” model (Lele *et al.* 2000; Schneider 1995). The complete paving of BR-163 highway raises the challenge of transforming this poor governance and “boom-bust” development model into a model of increasing governance and decreasing deforestation (Alencar 2005). In particular, a model that promotes higher and long lasting benefits to local and traditional populations, at the same time that it achieves the macroeconomic goals of international market integration.

The key elements for that transformation are not only dependent on the government in providing additional investments to road paving. The improvement of public services such as health care and education, the effectiveness of local government agencies, development of appropriate infra-structure for small-scale production, and the legal definition of land title for local and traditional populations will not in and of themselves mitigate more negative impacts promoted by road paving. There is a need for governance as a whole, which includes—in addition to the State carrying out its function—the capacity of society to organize its demands and call for them, exercising the social control of public

policies (Santos 1996; Nepstad *et al.* 2002; Alencar *et al.* 2004). An organized social movement with well structured demands can balance the social and political structure of power in the region and promote the spread of benefits of a development project such as road paving.

To address the issue of social inequality and resource overexploitation that accompanies regional development projects, it is necessary to analyze the socioeconomic behavior of the beneficiary group and how that affects the local and traditional communities' livelihood. This paper documents how changes in the power structure between the region's two main socioeconomic groups (private sector and the local and traditional communities) enhanced planning and governance in the case of the paving of the BR-163 highway. These two groups are analyzed based on their socioeconomic logic of natural resource use, as well as their ability to react and interfere politically in the process of road paving. In addition, it addresses the importance of socio-environmental alliances and political historical contexts in balancing the power structure and providing a framework for governance and regional development.

## **Study area**

The BR-163 is a federal highway built in 1972 as one of the government initiatives to integrate the Amazon with the rest of Brazil (Carvalho *et al.* 2001). This major Amazon highway has approximately 1760 km crossing the center of Mato Grosso and the southwest of Para states; of these, only 770 km are paved, mostly in Mato Grosso state (Figure 1). The other 990 km, located mainly in Pará state represents the main focus of the paving debate that gained force in 1999 with the launch of the Pluriannual Plan of 2000-2003, also called "Avança Brasil" (Ministério do Planejamento Orçamento e Gestão 1999). This road links contrasting realities as it stretches from soybean fields and intensive pastures in Mato Grosso state, the paved part of the road, to vast swathes of forested areas, extensive cattle pasture and small agriculture fields in Pará state. The combination of these land uses creates a landscape where 75% of the deforestation along 100 km from each side of the road occurs in Mato Grosso, while 25% of the deforestation along this economic corridor is found in Pará (Figure 1).

This road cuts one of the biggest and most continuous forest fragments in Pará and it is one of the most coveted timber frontiers of the Amazon (Lentini *et al.* 2005). Besides supporting the regional logging economy, this road is important to the regional and national economy in the current scenario as it decreases by almost 1000 km distance to a port, reducing the transport cost for soybean producers from the center and north of Mato Grosso to the international market (Alencar *et al.* 2005 ). Even with high benefits for the private sector (GEIPOT 2000; Alencar *et al.* 2005 ), if the paving is not followed by other types of investments to maintain local and traditional communities' viability and safety from displacement, this road may become another example of serious negative social and environmental impacts of infra-structure development (Carvalho *et al.* 2001; Nepstad *et al.* 2001; Carvalho *et al.* 2002; Nepstad *et al.* 2002). If on the one hand, the complete paving of this road may represent an opportunity for development to the private sector and to local and traditional communities (mainly colonists, settlers and traditional communities -

extractors, riverside dwellers and indigenous people); on the other hand, it may also increase competition from outsiders for land and resources.

In fact, the existence of large Federal and State Government areas along BR-163 in Para state has made a perfect environment for illegal appropriation by outside investors, land grabbers and land speculators with the announcement of the road paving (Alencar 2005; Fearnside 2007). The lack of governance and the absence of legal land tenure designation of federal state lands were important factors that contributed to the establishment of the private sector in the region, since it facilitated uncontrolled land and resources concentration (Nepstad *et al.* 2002). The mere announcement of paving already caused intensive migration and increased the population of the small villages and cities (Soares-Filho *et al.* 2004; Fearnside 2007; Garcia *et al.* 2007). This, in turn, accelerated and intensified agrarian conflicts, increasing the cases of violence and assassination of social movement leaders such as Sister Dorothy Stang and others (CPT 2004; Oliveira 2005; Campos and Nepstad 2006). The dispute for land and resources along BR-163 acted as one of the main forces of polarization between the private sector and the local and traditional communities, and became one of the main reasons of social organization by the later group.

### **Socioeconomic logic and natural resource exploitation**

The socioeconomic logic of natural resource exploitation in the Amazon's agricultural frontier has been demonstrated to be dominated by a private accumulation rationale in which the benefits are expected to be received in the short-term and by few people (Schmink 1994). This logic uses land and resource accumulation as a way to perpetuate private existence and surplus production. On one hand, land and resource accumulation represents the guarantee of private capital reproduction; on the other hand, however, it acts as a driver of social conflicts and the main cause of rapid natural resource degradation, since not all socioeconomic groups that live in the frontier have the same potential of investment, access to market, and political influence (Hall 1997). This dominant market-oriented strategy of natural resource appropriation has changed over the years in the Amazon. Globalization has contributed intensively to the strategy of natural resource use and played a major role in changing the new socioeconomic dynamic of Amazonian frontier. Instead of enhancing people's quality of life and promoting development, the globalization and international economic integration of Amazon-produced goods such as soybean and, more recently, beef (Nepstad *et al.* 2006) increases the gap between the rich and the poor, exacerbating the polarization in the society (Barkin 1997).

The paving of BR-163 highway has motivated and accelerated the legacy of private accumulation dynamics, natural resource exploitation, and socioeconomic inequality that permeates the Amazonian frontier. The ease with which natural resources may be appropriated and the support from the local and state political structure along the unpaved stretch of this road have benefited and attracted the private sector and capital investors, represented by loggers, ranchers, soybean farmers, miners and land grabbers. This unbalanced economic and political structure leaves the local and traditional communities (settlers, colonists, riverside dwellers, extractivists, and indigenous people) in a marginal situation regarding the benefits from land appropriation and natural resources use. The

direct linkages between the paving of this road and the needs of attending the international market by the powerful private sector, gives a good example of the role of globalization and market integration in changing the socioeconomic dynamic among this group and the local communities along the BR-163. The understanding of the interactions among these two groups and with natural resources, gives a basis to analyze how changes in power relationship can promote governance and natural resources conservation.

### **Private sector**

The existence of surplus, the logic of expanded production, the linkages with international markets, and the short-term needs of capital are some of the main characteristics of the private sector in the rural areas along the BR-163 highway. The possibility of cheaper integration with international markets promoted by the paving of BR-163, and the increase of international demand for products such as timber, meat, and soybean have influenced the strategy and intensity of natural resource use by the private sector in the region. Land appropriation and natural resource exploitation are the means of making profit of this capitalized group represented mainly by loggers and cattle ranchers, and has been intensified with the perspective of road paving.

The loggers are one of the main private sector groups active along the unpaved stretch of the BR-163 in Pará state. They represent the economic activity in the region which had the highest growth from 1998 to 2004, if compared with cattle ranching. During this period, the timber consumption by sawmills in the area more than doubled, increasing from 630 to 1,360 thousand m<sup>3</sup> (Lentini *et al.* 2005). This increase in production is related to the migration of loggers from the north of Mato Grosso to the southwest of Pará due to the scarcity of timber in the forests of the southern neighbor state, the existence of an unexploited vast forest area in the region, the possibility to buy large areas of cheap forested land, and the existence of cheap labor from deactivated local gold mining areas. This set of conditions was responsible for the consolidation of two major logging centers along the unpaved stretch of BR-163, Novo Progresso (including Moraes de Almeida and Castelo dos Sonhos) and Itaituba (including Rurópolis and Trairão) (Lentini *et al.* 2005), Figure 1).

The dynamics of the logging activity in the region and among these centers also changed since the announcement of this road paving in 1999. Prior to the announcement, the logging centers in the southwest of Pará were more oriented to the national market, but already had some areas dedicated to the external market, mainly in the north of the road. After the announcement, the accessibility of the region improved by initial investments in trafficability and the logging industry turned towards a more international market oriented strategy. Due to the fact that logging activity in the region is historically related to some extent to the international markets, changes in the global parameters of consumption directly affect timber extraction in the area, and may be responsible for the social and environmental impacts intrinsic to this activity. The increase of the BR-163 and the Amazon regions' participation as a whole in the international market of tropical wood is a response to the decrease of Asian supplies, and thus directly linked to the world dynamic of tropical wood consumption.

From the global to local scales, loggers in the region have a very important role in facilitating the opening of new fronts for agriculture activities, since they invest heavily in secondary roads, which are frequently used as a path of land occupation and deforestation. The behavior of this actor in terms of natural resource use follows the dynamic of the market (intensive logging, species driven) and is always based on profit maximization, mostly propitiated by the illegality of the extraction operation. In addition to possessing economic power, loggers also have strong influence in the local political arena throughout most of the cities of this region. They are the ones responsible for financial transactions and one of the biggest employers in the area. These two characteristics provide this actor with political power and respect by local society.

Cattle ranchers are another important group within the private sector in the context of the paving of the BR-163. They are the major forces behind the increasing rates of deforestation in the region, in which the cattle herds expanded by 60% between 1998 and 2004, increasing from 300 to 500 thousand head (IBGE 2005). Like the loggers, they own large pieces of land mainly near Novo Progresso (Figure 1). Cattle ranching in Amazonian frontier is an activity with low investment, risk, and production costs (Margulis 2003; Alencar *et al.* 2004). It uses a small amount of labor, and cattle have increasing value in the market (national and international). The establishment of large areas of cattle pasture has been practiced in the region since this road was first opened in the beginning of the seventies to justify the ownership of the land. This notion is being used again by land grabbers and cattle ranchers, who are opening thousands of square kilometers of forest along this road as a way of having some guarantee of land ownership. Land speculation (or the intention to engage in land speculation) is a major source of conflicts between ranchers and local and traditional communities in the region.

Although in this area part of the cattle expansion is related to land speculation, it is important to remember that this expansion is also associated with the availability of capital for investment. It also depends on the expansion of the increasing domestic and international markets of meat (Alencar *et al.* 2004; Nepstad *et al.* 2006). The increase of external demand for cattle meat, associated with the high prices of the product in the international market and incentives for export, can have a large effect on cattle expansion and an incentive to investments in better production in the region (Nepstad *et al.* 2006). The eradication of foot-and-mouth disease in Mato Grosso and the recent change in the category of Novo Progresso region for a zone with lower risk, allows producers along the southern part of the unpaved stretch of BR-163 to commercialize meat not only in the domestic market of central and south of Brazil, but also the external market. This new scenario of cattle ranching in the region is shifting production from being oriented more towards the local market to being more oriented to the national market, since part of the national sources are shifting to the international market.

All these regional, national and international forces are directly affecting the local dynamic of land use change and are redefining the socioeconomic relationships between the local and traditional communities with cattle ranchers. The ranchers are social and economic actors with strong political power in the region. In contrast with the loggers whose power is derived from their effective role in capital generation, the ranchers' power

is associated with tradition and the historical social relations in the area. They are perceived as the future of the region and as the main force against the establishment of local and traditional communities.

### **Local and traditional communities**

Local and traditional communities compose a sociopolitical and economic group that is characterized mainly by its family type of production, with the main focus on subsistence. This group represents approximately 58% of the rural population of the region (IBGE 2001). It includes a diversity of smallholders with different strategies of natural resource use that vary from less contact with the market, such as riverside dwellers or extractivists with diversified production systems, to a more market oriented production, such as settlers and colonists. However, due to the lack of political and economic power of this group, their land and resources are persistently threatened by private sector groups, generating conflicts that have intensified with rumors of the paving of the BR-163. Thus, a likely benefit of road paving might in fact generate large scale smallholder displacement, and increase the demand for public services in local cities, which the government did not seem prepared to provide.

The main threats to this group include the instability of the land tenure situation, the lack of infra-structure for production and commercialization, and the lack of social organization and viable economic alternatives to the actual production system. In this region, the smallholders that are not located along the rivers without officially delimited areas are located in settlements and colonies along the road (100 ha average per family) or on legally unrecognized pieces of land. The basis of production of this diversified group is annual and perennial crops used mainly for subsistence, since what they sell is also converted to goods for their use (Hall 1997). Besides agriculture, the income of local and traditional communities of smallholders is also based on extraction of timber and non-timber forest products (NTFP), as well as small-scale extensive cattle ranching. They access local markets and are distant from national and international markets. Globalization and market integration may significantly change the livelihoods of this group, since the logic of capital accumulation benefits the expansion of other more capitalized groups.

Although settlers and colonists represent a part of the smallholder group that is more attached to a market strategy, this group is suffering the effects of the international market integration, which is pushing other activities to the region and generating large-scale land concentration. Settlers and colonists use natural resources more intensively and have generated more environmental problems compared to other types of small-scale producers. The settlements and official colonization projects established in the area in the late seventies and early eighties present a scenario in which more than half of the small properties are deforested and with the remaining forest already exploited. The deforested area in these properties is dominated by unproductive pastures, with few areas of secondary growth. Because of the economic instability and the lack of prospects for government investment, the settlers and colonists are selling their land to larger and capitalized producers, changing the configuration of the social structure in the area. The future of this small producer's landscape will tend to be the spread of cattle ranching if investments in more adapted and profitable agriculture systems are not made by the government.

The riverside dwellers and extractivists are in a worse situation compared to the settlers and colonists since they do not have formal recognition of their land. Because of lack of access to the market, these traditional communities developed a diversified system of production that includes the harvest of annual and perennial crops, as well as NTFP exploitation of products such as Brazil nut, rubber, copaiba oil and others. However, it is this same weak market connected alternative land use logic, which represents a more long lasting form of relationship with natural resources, that gave rise to proposals for extractive reserves in Acre (Allegretti 1990). This was only possible because of a strong social organization and the external alliances with environmental groups made towards the proposal of guarantying legal rights for traditional people to their land. In the case of traditional communities of the BR-163 region, to alleviate the impact of these communities' displacement generated by road paving dynamics, it is first necessary to guarantee formal land rights to traditional populations and then invest in community forest management initiatives as economic alternatives for these groups.

In sum, while the new socioeconomic logic driven by external market interference is generating the expansion of the private sector groups, it is simultaneously enhancing poverty for local and traditional communities. This reflects the development contradiction promoted by the access to new markets and resources. The real development that is expected to be brought by the paving should enhance the quality of life of all BR-163 inhabitants, and promote sustainable use of natural resources and not only favor the capitalized and powerful sector with more environmental unfriendly practices. To achieve this development, the BR-163 region needs investments that strengthen the social and economic capacity of the less powerful groups in organizing themselves and their demands, as well as promoting alternatives to less damaging market integration. The balance in the power structure is fundamental for the local and traditional communities to achieve their demands and guarantee a space in the regional socioeconomic dynamic.

### **Environmental alliances and government reaction**

Environmental organizations represented an important group that helped to change the power structure between the private sector and local and traditional communities in the case of BR-163 region. They were formed by a group of non-profit and non-governmental organizations (NGO's) working in the area with the goal of promoting sustainable practices of natural resource management. Since the objectives of these NGO's were closer to the local and traditional communities in terms of environmental recognition of natural resource, alliances were made to improve the quality of life of these people and disseminate environmental sound land use practices. This alliance gave strength to the debate of road paving and its impact on natural environment and local population. Using the argument of inclusive sustainable development, the social and environmental movements joined forces and gained the status of a social-environmental movement bringing attention to the BR-163 paving project and needs for governance.

The recognition of environmentalists as allied by local and traditional communities was a natural process in the case of BR-163. Local and traditional communities saw in the environmental movement the chance to voice their concerns and to increase political power

in the face of current, persistent threats of losing land and forest resources. From the environmental movements' point of view, an alliance with local and traditional communities could represent a chance to promote sustainable forest-based land uses and conservation of natural resources. The result of this political alliance was an adaptation of the social justice and environmental and conservation discourses to a more unified socio-environmental discourse.

The union of the social needs with the environmental interests created a powerful constituency to press the government for the investments intended for the region. This movement began to be organized in 2003 with the objective of creating a development platform based on a list of governance priorities for the BR-163 region surrounding the section of the highway to be paved. This platform was built following an extensive agenda of meetings. This agenda included more than 10 preparatory meetings designed to incorporate the specific demands of four regions of Pará and Mato Grosso states that were going to be affected by the road paving. The results of these meetings were used as a basis for developing four regional proposals that were consolidated in four regional meetings in November and December of 2003. The results of these meetings, which involved more than a thousand local representatives, were consolidated in one last general meeting where the all demands were systematized by themes. This last meeting took place in March 2004 in Santarém and had as the main product the first document of the group spelling out priorities for investment divided in five themes: (1) Infra-Structure and Basic Services; (2) Land Zoning and Conflict Resolution; (3) Strategies for Sustainable Production and Natural Resource Management; (4) Social and Cultural Strength of Local Population; (5) Environmental Management, Monitoring and Protected Areas (Consortio Socioambiental da BR-163 2004). The results from this meeting were summarized in a document called "Letter of Santarém" which was personally handed to the Minister of the Environment and Minister of the National Integration during the meeting.

The government reacted to the social movement organization, and in April 2004 launched the first draft of the proposal for the sustainable development of the BR-163 region (Grupo de Trabalho Interministerial 2005). This plan was perceived by the government as an inter-ministerial effort to diminish the negative socio-environmental impacts of this road paving. The political context for the claims of organized civil society could not be better. Both the Brazilian president and the Minister of Environment were strong supporters of the participatory framework used to discuss the future of the BR-163 region. However, inside the government, strong forces opposed to the planning process and the attention given to it pressured for a more rapid and less participatory means to paving the road. These forces were defending the private sector groups, which to some extent mirrored the power relationships between private sector and social-environmental movement representing the local and traditional communities.

In spite of the polarized forces acting inside the government arena, all stakeholders involved agreed on the same objective, the paving of the road. This common goal favored negotiations among different interest groups inside and outside the government, and allowed the implementation of the proposed governmental plan to begin. The official plan incorporated many of the social-environmental movement demands as well as tried to

orient and legalize private sector main activities in the region. The primary demand was the zoning of the entire area along the proposed paved stretch of BR-163 highway. This zoning contemplated the creation of several conservation units for strict protection and sustainable use - Figure 1 (Alencar 2005; Campos and Nepstad 2006; Fearnside 2007). The zoning initiative also included the definition and creation of the Forest District (Figure 1), to promote legal logging operation. The second set of government reactions included several investigations and police operations to fight corruption inside federal agencies responsible for natural resource management and surveillance and land titling. These operations inhibited some illegal activities, having a positive impact on decreasing the rates deforestation (Figure 2) and land speculation in the region. In addition, governmental agencies already established in the area, such as the Federal Environmental Agency (IBAMA), the Federal Police, the Agrarian Reform Institute (INCRA) and other federal agencies, had part of their staff renewed or changed and some new offices created. In fact, the increase of government presence along this highway motivated by the organized civil society demands and pressure made the BR-163 planning process one of the first experiences of frontier governance in the Amazon with a major contribution for Amazon conservation initiatives.

## **Conclusion**

The transformation of the “boom-bust” model of natural resource exploitation into a model of decreasing deforestation together with higher and long lasting benefits to local and traditional populations appears to be a difficult task in the logic of private capital accumulation and international market integration. However, the organization of local and traditional communities towards a development agenda, together with environmental alliances and the recognition of this agenda by the government can balance the power structure imposed by the local and regional private sector in the BR-163 region and promote development for these communities.

This proved to be true when a recent government strategy to defend the traditional and local communities’ territory in the region was developed as a result of organized pressure from the socio-environmental movements of BR-163 (Grupo de Trabalho Interministerial 2005). New extractive reserves and settlements were created as a strategy to take the rural poor’s traditional lands out of the market and partially avoid conflict with other economic groups. However, land alone is not a guarantee of development for these people. It is critical to invest in infra-structure for small-scale commercialization. One approach is reinforcement of some existing relationships among the logging sector and the settlers and colonists, in which the logger provides good road infra-structure and the settlers and colonists provide wood for sawmills in a fair trade model (Lima *et al.* 2003). Another important point is the availability of credit to support activities more appropriate for small scale and family production. The history of credit for small producers in the Amazon has largely fomented the spread of cattle ranching, but has not resulted in economic return to the communities (Costa 2000). Proambiente, which is a credit policy that pays for environmental services, is an interesting initiative to give incentive to best practices in small scale agriculture (Mattos and Pereira 2003). In addition, it is necessary to develop community forest management initiatives that can establish a more straight relationship with local and regional markets (Amaral and Amaral 2000; Mcgrath and Peters 2002)

The lessons from the BR-163 planning process indicate that organized political pressure is necessary to make government infra-structure investments positively affect all socioeconomic groups. The BR-163 planning process demonstrated that alliances between social and environmental institutions were crucial to bring government attention to the impacts of road paving and the unbalanced power structure in the region. The rapid advances in linking up groups in BR-163 and the social movement organization towards the same objective (a unique regional plan) gave strength and power to the social-environmental development proposal. The government response on zoning and creation of conservation units designated for sustainable use of traditional communities was an important first step to decreased the conflicts in the region and establish a basis for governance. Even if investments in strategies for sustainable production are still insufficient, the achievements of the social and environmental movements in BR-163 region represent the first step towards the possible reconciliation between infrastructure investment, economic development, conservation, and governance on the Amazon frontier.

### References:

- Alencar, A. 2005. A rodovia BR-163 e o desafio da sustentabilidade. In: Relatório do Projeto Monitoramento Ativo da Participação da Sociedade -MAPAS. IBASE. Rio de Janeiro, IBASE: 1-21.
- Alencar, A., L. Micol, J. Reid, M. Amend, M. Oliveira, V. Zeidemann and C. d. S. J. W. 2005 A pavimentação da BR-163 e os desafios à sustentabilidade: uma análise econômica, social e ambiental. Available in: <http://conservation-strategy.org/files/BR-163%20Arquivo%20final%20Grafica.pdf>.
- Alencar, A., D. Nepstad, D. McGrath, P. Moutinho, P. Pacheco, M. D. C. Diaz and B. Soares Filho. 2004. Desmatamento na Amazônia: Indo Além da Emergência Crônica. Belém, IPAM. 90. Available in: <http://www.ipam.org.br>.
- Allegretti, M. H. 1990. Extractive Reserves: an alternative for reconciling development and environmental conservation in Amazônia. In: Alternatives to Deforestation: Steps Towards Sustainable Use of the Amazon Rain Forest. A. Anderson. New York, Columbia University Press.
- Alves, D. 2002. An analysis of geographical patterns of deforestation in Brazilian Amazônia the 1991–1996 period . In: Patterns and Processes of Land use and Forest Change in the Amazon. C. Wood and R. Porro. Gainesville, University of Florida.
- Amaral, P. and M. Amaral. 2000. Manejo florestal comunitário na Amazônia Brasileira: situação atual, desafios e perspectivas. Brasília, Instituto Internacional de Educação do Brasil (IIEB).
- Barkin, D. 1997. Overcoming the Neoliberal Paradigm: Sustainable Popular Development. Available in: <http://136.142.158.105/LASA97/barkin.pdf>.

- Becker, B. 2001. Revisão das políticas de ocupação da Amazônia: é possível identificar modelos para projetar cenários? *Revista Parcerias Estratégicas* **12**.
- Browder, J. O. and B. J. Godfrey. 1997. Rainforest Cities: Urbanization, development, and globalization of the Brazilian Amazon. New York, Columbia University Press.
- Campos, M. T. and D. Nepstad. 2006. Smallholders, The Amazon's New Conservationists. *Conservation Biology* **20**(5): 1553–1556.
- Carvalho, G., A. C. Barros, P. Moutinho and D. Nepstad. 2001. Sensitive development could protect Amazonia instead of destroying it. *Nature* **409**: 131.
- Carvalho, G., D. Nepstad, D. Mcgrath, M. D. C. Diaz, M. Santilli and A. C. Barros. 2002. Frontier expansion in the Amazon, balancing development and sustainability. *Environment* **44**(3): 34-45.
- Chomitz, K. M. and T. S. Thomas. 2001. Geographic patterns of land use and land intensity in the Brazilian Amazon. Washington, D.C., World Bank Available.
- Consortio Socioambiental da BR-163. 2004. Relatório do Encontro "Desenvolvimento que Queremos: Ordenamento Territorial da BR-163, Baixo Amazonas, Transamazônica e Xingu". Available in: <http://www.ipam.org.br/programas/planejamento/br163/desenvolvimento.php>.
- Costa, F. A. 2000. Contexto, impactos e efeitos econômicos do FNO-Especial no Estado do Pará. Campesinato e Estado na Amazônia. L. R. TURA and F. d. A. COSTA. Brasília, FASE.
- CPT. 2004. Conflitos no Campo Brasil. Available in: <http://www.cptnac.com.br>.
- Faminow, M. D. 1998. Cattle, Deforestation, and Development in the Amazon: An Economic, Agronomic, and Environmental Perspective. New York, CAB International.
- Fearnside, P. M. 2007. Brazil's Cuiaba-Santarem (BR-163) Highway: The Environmental Cost of Paving a Soybean Corridor Through the Amazon. *Environmental Management* **39**: 601-614.
- Garcia, R. A., B. S. Soares-Filho and D. O. Sawyer. 2007. Socioeconomic dimensions, migration, and deforestation: An integrated model of territorial organization for the Brazilian Amazon. *Ecological Indicators* **7**: 719-730.
- GEIPOT. 2000. Análise de rotas alternativas para a soja. Available in: [http://www.geipot.gov.br/estudos\\_realizados/soja/quadros\\_24,27.htm](http://www.geipot.gov.br/estudos_realizados/soja/quadros_24,27.htm).

Grupo de Trabalho Interministerial. 2005. Plano de Desenvolvimento Sustentável para a Área de influência da BR-163. Available in: <https://www.planalto.gov.br/casacivil/arquivosPDF/BR163.pdf>.

Hall, A. L. 1997. Sustaining Amazonia: Grassroots Action for Productive Conservation. New York, Manchester University Press.

Hecht, S. and A. Cockburn. 1989. The Fate of the Forest. Developers, Destroyers and Defenders of the Amazon. New York, Penguin Group: 357.

IBGE. 2001. Censos Agropecuários 1970 e 2000. Available in: <http://www.sidra.ibge.gov.br>.

IBGE. 2005. Pesquisa pecuária Municipal. Available in: <http://www.sidra.ibge.gov.br>.

Lele, U., V. M. Viana, A. Verissimo, S. Vosti, K. Perkins and S. A. Husain. 2000. Forests in the Balance: Challenges of Conservation with Development. Washington, D.C, World Bank.

Lentini, M., D. Pereira, D. Celentano and R. Pereira. 2005. Fatos Florestais da Amazonia 2005. Belém, IMAZON. 138. Available in: <http://www.imazon.org.br>.

Lima, E., A. A. Leite, D. Nepstad, K. Kalif, C. Azevedo-Ramos, C. Pereira, A. Alencar, U. Lopes and F. Merry. 2003. Florestas familiares: um pacto socioambiental entre a indústria madeireira e a agricultura familiar na Amazônia. Belém, Instituto de Pesquisa Ambiental da Amazônia. 106. Available in: <http://www.ipam.org.br>.

Mahar, D. J. 1989. Government Policies and Deforestation in Brazil's Amazon Region. Washington, D.C, World Bank.

Margulis, S. 2003. Causes of Deforestation in the Brazilian Amazon. Washington, DC, World Bank.

Mattos, L. and C. Pereira. 2003. Análise da variabilidade econômica do PROAMBIENTE na Amazônia. Cadernos de Ciência e Tecnologia (CC&T). Brasília, EMBRAPA: 18.

Mcgrath, G. D. and M. C. Peters. 2002. Community Forestry for Small-Scale Furniture Production in the Brazilian Amazon. Working Forests in the Tropics. D. Zarin. Gainesville, University of Florida.

Ministério do Planejamento Orçamento e Gestão. 1999. Avança Brasil - Plano Plurianual de Investimentos para o período 2000-2003. Available in: <http://www.abrasil.gov.br/nivel1/infra.htm>.

Ministério do Planejamento Orçamento e Gestão. 2003. Plano Brasil de Todos: PPA 2004-2007. Available in: <http://www.planejamento.gov.br>.

- Nepstad, D., G. Carvalho, A. C. Barros, A. Alencar, J. P. Capobianco, J. Bishop, P. Moutinho, P. Lefebvre, U. L. Silva JR and E. Prins. 2001. Road paving, fire regime feedbacks, and the future of Amazon forests. *Forest Ecology and Management* **154**: 395-407.
- Nepstad, D., D. McGrath, A. C. Barros, A. Alencar, M. Santilli and M. d. C. Diaz. 2002. Frontier governance in Amazonia. *Science* **295**: 629-630.
- Nepstad, D. C., C. M. Stickler and O. T. Almeida. 2006. Globalization of the Amazon Soy and Beef Industries: Opportunities for Conservation. *Conservation Biology* **20**(6): 1595-1603.
- Oliveira, A. U. 2005. Br-163 Cuiabá-Santarém: Geopolítica, grilagem, violência e mundialização. In: *Amazônia Revelada: Os descaminhos ao longo da Br-163*. M. Torres. Brasília, CNPq: 67-183.
- Santos, M. H. d. C. 1996. Governabilidade, governança e capacidade governativa: algumas notas. Brasília, MARE/ENAP.
- Schmink, M. 1994. The socioeconomic matrix of deforestation. Population and environment: rethinking the debate. L. Arizpe, P. Stone and D. Major. Boulder, Westview Press: 253-275.
- Schmink, M. and C. Wood. 1992. *Contested Frontiers in Amazonia*. New York, Columbia University Press.
- Schneider, R. 1995. *Government and the Economy on the Amazon Frontier*. Washington, D.C., World Bank. **11**.
- Soares-Filho, B., A. Alencar, D. Nepstad, G. Cerqueira, M. d. C. Diaz, S. Rivero, L. Solorzano and E. Voll. 2004. Simulating the Response of Deforestation and Forest Regrowth to Road Paving and Governance Scenarios Along a Major Amazon Highway: The Case of the Santarém-Cuiabá Corridor. *Global Change Biology* **10**: 745-764.
- Walker, R. T. and A. K. O. Homma. 1996. Land use and land cover dynamics in the Brazilian Amazon: An overview. *Ecological Economics* **18**: 67-80.

**List of figures:**

Figure 1. Regional map of the paved and unpaved stretches of BR-163 Highway crossing Para and Mato Grosso states. The “old conservation units” represent the Federal and State conservation units created before March 2004. The “new conservation units” represent the 17 Federal and State conservation units embracing an area of more than 15 million of hectares created as a result of the BR-163 participatory planning process. Note the high concentration of deforestation along the paved stretch of the Highway in Mato Grosso state and the delimitation of the forest district.

Figure 2. Annual deforestation increments inside the BR-163 forest district, and deforestation rates for Pará state (Source: INPE, Prodes Digital, and IPAM BR-163 database). Note an increase on annual deforestation from 1999 to 2004, period when the paving project was announced, as well as an abrupt decrease in deforestation after government intervention, zoning and the creation of conservation units. Between 2004 and 2005 there was a decrease of 60% in the annual deforestation along BR-163 in Pará. This rate was about two times higher than the rest of Pará state and the entire Amazon.

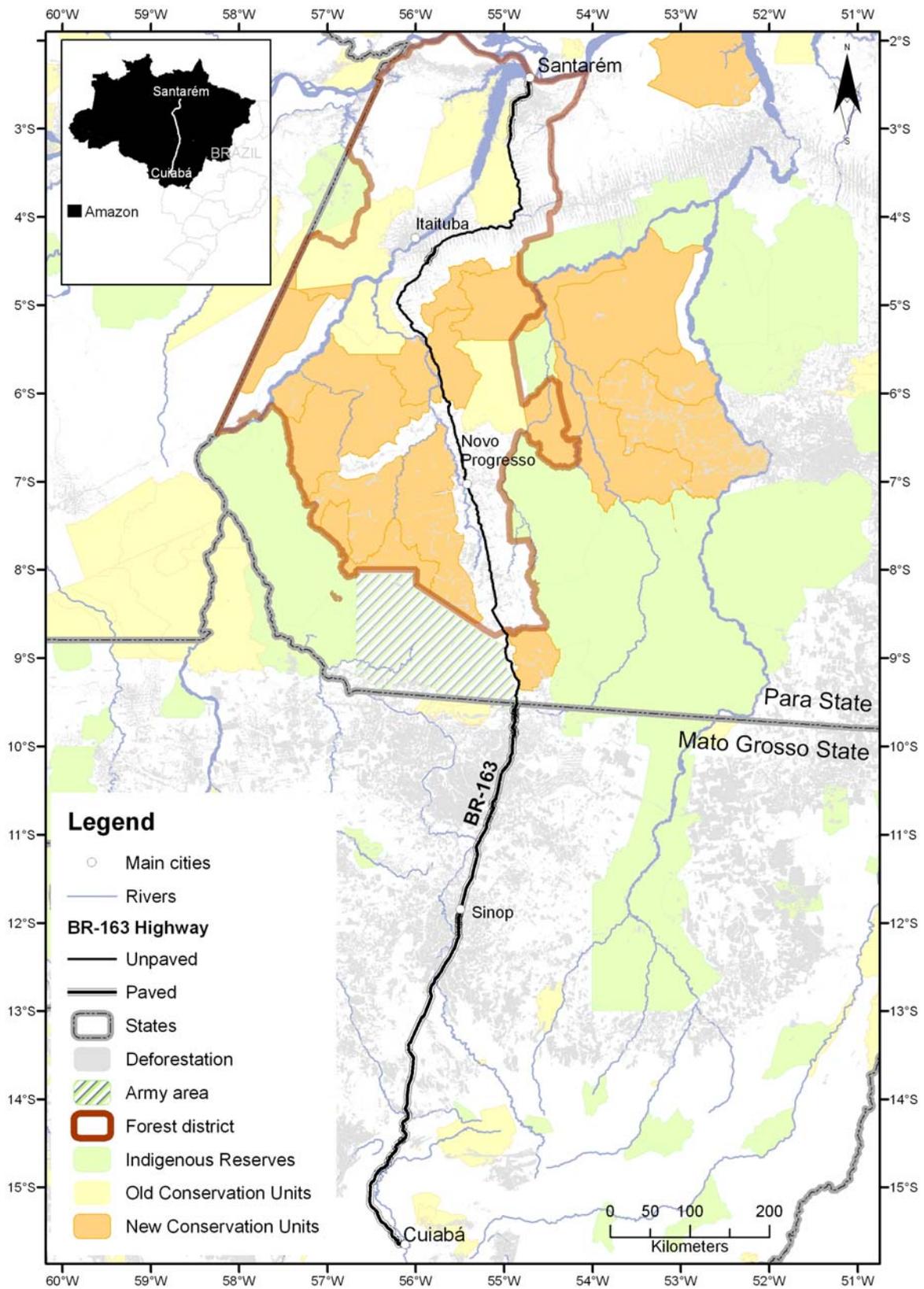


Figure 1.

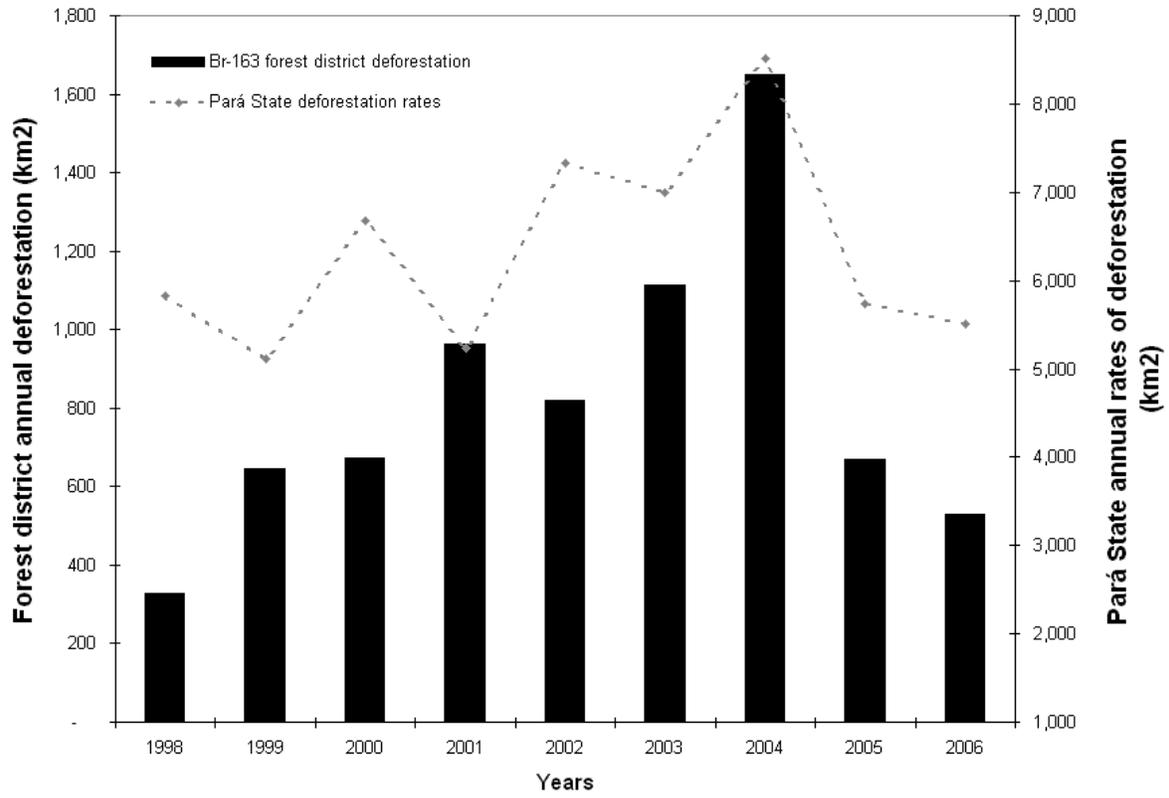


Figure 2.